





Digitized by the Internet Archive  
in 2008 with funding from  
Microsoft Corporation

Med. A.  
Biological  
& Medical  
Serials

# ANNUAL

OF THE

# UNIVERSAL MEDICAL SCIENCES

A YEARLY REPORT OF THE PROGRESS OF THE GENERAL  
SANITARY SCIENCES THROUGHOUT THE WORLD.

EDITED BY

CHARLES E. SAJOUS, M.D.,

LECTURER ON LARYNGOLOGY AND RHINOLOGY IN JEFFERSON MEDICAL COLLEGE, PHILADELPHIA, ETC.,

AND

SEVENTY ASSOCIATE EDITORS,

ASSISTED BY

OVER TWO HUNDRED CORRESPONDING EDITORS, COLLABORATORS,  
AND CORRESPONDENTS.

Illustrated with Chromo-Lithographs, Engravings and Maps.

VOLUME IV.



1888.

PHILADELPHIA AND LONDON:

F. A. DAVIS, PUBLISHER.

THE OCEANIC PUB. CO., } ..... AGENCIES..... { J. A. AIKEN,  
Sydney, N. S. Wales. } Cape Town, Cape Colony.

---

Entered according to Act of Congress, in the year 1888, by

F. A. DAVIS,

In the Office of the Librarian of Congress at Washington, D.C.

---

Printed by  
F. A. Davis & Co., Publishers,  
1015 F Street, N.W., Washington, D.C.



## DISEASES OF THE UTERUS.

By PAUL F. MUNDÉ, M.D.,

EGBERT H. GRANDIN, M.D., AND BROOKS H. WELLS, M.D.,

NEW YORK.

### EROSIONS AND LACERATIONS OF THE CERVIX.

CUSHING<sup>1</sup> has shown, through the study of microscopical specimens, that the recent theories regarding the part played by the glands of the cervix in the so-called ulcerative processes have a substantial basis of fact. By means of micro-photographs he shows that in many cases where there seemed to be a great loss of substance, the layer of cylindrical epithelium was still intact. In such cases, he holds that true ulceration had not taken place, the condition known as erosion being rather an active formation of glandular tissue. In other instances, as in case of carcinomatous and tubercular ulceration, this line of cylindrical epithelium was absent. Referring to the work of Ruge and Veit, he shows that what are called erosions, ulcerations, etc., are various degrees of one process which consist essentially in a new formation of glandular tissue on the surface of the vaginal portion or in the cervical canal. These glands are formed by a reduplication of the lowest layer of the cells of the rete Malpighii which are developed into a delicate cylindrical epithelium, forming a layer which everywhere lines the glands as well as the parts between them. The interglandular tissue grows upward, while the glands grow downward, all being everywhere covered with a continuous layer of cylindrical epithelium. This process goes on under the layer of flat epithelium which naturally covers the cervix outside of the cervical canal; this layer is then lost, but no proper erosion occurs; what was formerly considered as such being a patch where the flat epithelium has been replaced by glandular formation. This process may extend over the outer surface of the cervix, where few, if any glands, normally exist, or even to the vagina, and, in exaggerated cases, may resemble cancer so closely that a diagnosis cannot be

made without the aid of the microscope. Indeed, these so-called erosions, when inveterate, not infrequently become cancerous. In regard to the latter point, Fitz<sup>1</sup> expresses decided doubt as to the importance of erosions in the etiology of cancer, and he also calls attention to the popular view that cancer is dependent on local irritation—a view which he considers untenable. Baker,<sup>1</sup> Marcy,<sup>1</sup> Green<sup>1</sup> and Strong<sup>1</sup> agree with the views expressed by Cushing in regard to the relation between erosions and cancer; but in view of the frequency with which erosion is met with in the nullipara and the infrequency of cancer of the cervix, we are inclined to think that these views will not at present find acceptance amongst the generality of gynecologists. Of course, we have not now in mind erosions of the lacerated cervix. Chadwick<sup>1</sup> and Bigelow<sup>1</sup> claim that it has never been proven that cancer has developed from an erosion. Miller<sup>2</sup> has expressed views in accord with those of Cushing.

A somewhat radical protest has been entered by Noeggerath<sup>3</sup> against the views generally held concerning the etiological importance of laceration of the cervix in the production of uterine disease. His deductions are reached from an examination of one hundred cases of uterine disease, fifty with intact, and fifty with deeply lacerated cervixes, and they may be summarized as follows: Patients with uterine disease conceive more readily with lacerated than with intact cervixes and they abort less readily. Laceration of the cervix does not affect the position of the uterus, nor does it cause any increase in depth of the uterus. Erosions and ulcers and diseased cervical tissue are met with as frequently where the cervix is intact as where it has been lacerated. Lacerations have no influence on the development of uterine affections, either in regard to number or intensity. Eversion of the lips is never the immediate consequence of laceration. He claims that, except immediately after labor, the lesion is of no importance and he believes that the time will come when laceration will be struck out of the list of pathological affections of the cervix. In criticism we are inclined to think that an analysis of a further hundred or more cases would lead to diametrically opposed conclusions, for it is hardly conceivable that American gynecologists, almost as a unit, should have persistently exaggerated in every particular all of the results which follow laceration of the cervix; we state this while

not blind to the fact that the effects of the lesion have been somewhat exaggerated.

During the past year, the usual number of papers have been written on the subject of lacerations of the cervix. Cleveland<sup>4</sup> argues for the necessity of early closure of the lacerated cervix in order to forestall likely after-results, such as subinvolution, hyperplasia, and neuroses. He also argues that the operation is then much easier of performance, as no large amount of tissue has to be removed, and certainly not the hard, cicatricial masses that are often to be found later. Janvrin<sup>4</sup> also advocates operation within three or four months after delivery, for the purpose of avoiding late symptoms. Spanton<sup>5</sup> calls renewed attention to the advisability of early operation as a measure calculated to forestall the possible development of malignant disease.

Emerling<sup>6</sup> advocates the now generally accepted view that lacerations should be stitched immediately after labor only when hæmorrhage is obstinate, and not, as was strongly advised by Pallen some years ago, as a routine measure. In regard to the general performance of the operation, Ritter,<sup>7</sup> Montgomery,<sup>8</sup> and Hadra<sup>9</sup> have expressed temperate views, advocating it only in the presence of symptoms which can be directly traced to the lesion.

Juillard<sup>10</sup> has added another to the list of cases where trachelorrhaphy has been performed in ignorance of the existence of pregnancy and in which the gestation was not interrupted. Doléris<sup>4</sup> goes further and advocates trachelorrhaphy in cases where there is profuse, fetid vaginal discharge, with pain and tenderness of the cicatrix, his object being to prevent abortion, narrating a case where he operated successfully at the seventh month.

#### INFLAMMATORY AFFECTIONS.

Under this term we can conveniently classify subinvolution and its later stage, areolar hyperplasia, cervical and corporeal endometritis.

*Subinvolution and areolar hyperplasia*, in accordance with the nearly generally accepted views of to-day, are closely related, in that the latter is a direct sequence of the former. This view is not disproved by the fact that hyperplasia is met with in the nullipara, for, reduced to first principles, the subinvolved uterus is a congested uterus, and in the nullipara as well as in the parous

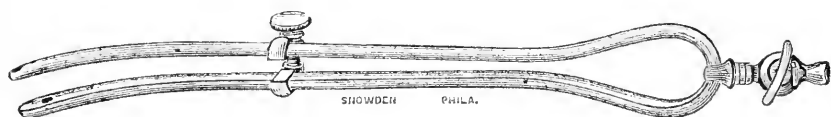


woman repeated hyperæmia, producing first enlargement and softness, ultimately terminates in that development of fibrous tissue which constitutes the essential pathological factor in hyperplasia. Eastman<sup>11</sup> questions if areolar hyperplasia may not become sufficiently marked and circumscribed to receive the name of interstitial fibroid, and whether all varieties of fibroid tumors are not localized conditions of diffuse areolar hyperplasia. He asks, further, if microscopists do not agree that the areolar hyperplasia of arrested involution and fibroid tumors both originate in uterine hyperæmia.

*Treatment.*—In the treatment of subinvolution and areolar hyperplasia, electricity seems to be gaining the confidence of the profession. It may be employed in the form of galvanism, using a current of from twelve to thirty cells (Eastman<sup>11</sup>), or more. The method of administration of the electricity is by means of a large electrode over the abdomen, connected with the negative pole, and the positive pole against the cervix or within the cavity of the uterus. Practically the strength of the current need only be limited by the endurance of the patient. Mundé states that his conclusions published in 1885<sup>12</sup> have been in every way corroborated by later experience. Wyman<sup>13</sup> recommends in subinvolution the application of dry chloride of sodium. This is mixed with powdered elm bark and powdered hyoscyamus leaves, in the proportion of one ounce of the salt to three ounces of the bark and one drachm of the leaves. This is to be applied on tampons every other day, the effect being to deplete the uterus by the withdrawal of fluid. Mitchell<sup>4</sup> advocates, as an adjuvant to other means, tamponing the cavity of the uterus with pledgets of glycerine, which accomplishes the same aim as Wyman's method, but is certainly more radical and probably would not be borne so well by the patient. Polakillon<sup>14</sup> records a case of hyperplasia accompanied by profuse hæmorrhages which did not yield to ordinary means, where he succeeded by removing the ovaries. Other methods of treating subinvolution and hyperplasia must necessarily be considered under the head of endometritis.

*Endometritis.*—During the current year, attention has been strongly directed toward the subject of the treatment of affections of the endometrium. There has been a decided tendency, on the one hand, to dispense with direct local treatment and an equally marked determination, on the other, to insist on the advisability

as well as the necessity, of such measures in order to effect more than transient palliation. It is indeed curious to notice the claims made by the advocates of each side of this question, that by measures apparently diametrically opposed, the same result may be obtained. Here, as elsewhere in disputed matters depending on the individual experience of men of the same expertness, there is truth on each side, and it is the extremes which are to be avoided. Thomas Addis Emmet<sup>15</sup> is strongly opposed to the practice of making applications to the interior of the uterus in the treatment of endometritis. He claims that the discharges from the endometrium are, in general, the result of hyperæmia which is secondary to mechanical or pathological changes outside of the uterus, and that rational treatment hence consists in measures directed toward the relief of the cause and not of the consequence. He has therefore abandoned the



DOLÉRI'S IRRIGATING CANULA.—(Nouv. Archives de Gynecol. et d'Obstet.)

practice of internal applications, except as a means of arresting hæmorrhage or where he was satisfied of the presence of vegetations or of new growths in the uterus. He has found that patients treated since he has abandoned the use of internal applications, averaged nearly seven weeks less time under treatment than when it was his custom to resort to them. He has substituted vaginal medication, that is to say, the glycerine tampon, the hot douche, etc., and by thus relieving the pelvic congestion, he succeeds in checking the hypersecretion from the endometrium. Diametrically opposed to these views are those elaborated at great length by Doléris.<sup>16</sup> He claims that the lesion is in the endometrium and that therefore the treatment must be local. The measures he advocates are of the most radical nature. His practice is to thoroughly dilate the cervix, where necessary, by aseptic tents and then to

curette and to brush out the uterine cavity. The brush is dipped in a solution of carbolic (1 : 4 or 1 : 10) before use, and the cavity is next thoroughly irrigated with carbolic (1 : 25), or sublimate (1 : 2000), by means of the canula he has specially devised. This canula insures patency of the cervix during irrigation. The brushing and irrigating will occasionally not have to be repeated; in the large number of instances in which he has resorted to the procedure, repetition has never been needed more than seven times. Mundé<sup>17</sup> makes a strong plea in favor of intra-uterine medication. He protests against the growing tendency to abandon applications above the internal os, believing that herein we possess a means of cure for which as yet there is no substitute. In the following conditions, in particular, he does not feel that he could dispense with them: 1. Chronic endometritis in nulliparæ; 2. Villous endometritis, to effect a permanent cure, after removal of the vegetations by means of the curette; 3. Chronic subinvolution and hyperplasia (on account of the associated endometritis); 4. Metrorrhagia from a flabby or subinvolved uterus. In these conditions, whilst he resorts to intra-uterine applications, this is not to the exclusion of the measures on which Emmet depends alone. Equalization of the pelvic circulation, relief of pelvic congestion, are aims kept in view, as well as direct treatment of the endometrium, where pathological changes have also taken place. As opposed to such opinions and more in accord with Emmet, Engelmann,<sup>4</sup> although he does not entirely reject resort to intra-uterine applications, claims that the sphere of their applicability should be greatly narrowed and that rarely should any but the milder agents be used. Vaginal, or indirect, medication by means of dry tampons of cotton, wool, or jute, impregnated with various agents or else serving as carriers for powders, is in the vast proportion of cases sufficient in his hands for cure, and, withal, without any of the possible ill effects which may follow intra-uterine applications. This method, of which Engelmann treats *in extenso*, aims chiefly at modifying or equalizing the peri-uterine circulation and thus indirectly relieving the hyperæmia of the endometrium.

Landau<sup>18</sup> recommends as a preparatory measure to intra-uterine applications in chronic endometritis, dilatation of the uterus by means of an iodoform tampon, as in Vulliet's method. We are



then in a position to make our applications more directly to the endometrium. The technique of this preparatory dilatation is as follows: The cervix is exposed in Sims' position, is steadied by a tenaculum, and a long, thin piece of iodoform gauze is gradually pushed into the uterine cavity until it is completely filled; this process is repeated at varying intervals (twenty-four to thirty-six hours) until the cavity is sufficiently open for inspection. After the requisite application has been made, the cavity may again be tamponed in order to insure permanent dilatation during the course of treatment. This method is claimed, by those who have tested it, to be productive of none but good results, and Landau, among others, has tried it in routine office practice without ill effects.

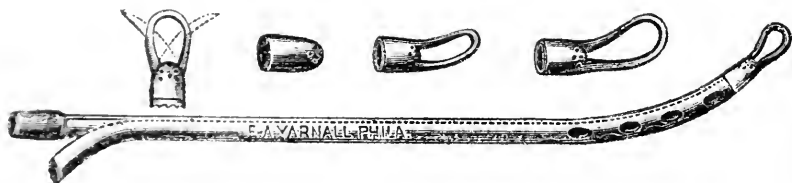
Of the various agents which have been recommended for intra-uterine medication we would note the following: Dobrouaroff<sup>19</sup> recommends crude pyroligneous acid as being an energetic styptic, a mild caustic, and a reliable antiseptic agent. Cherou<sup>20</sup> claims good results in case of fungous endometritis from intra-uterine injections of picric acid, in the proportion of 5j. to Oiss. of warm water, the injection to be given through the Bozeman catheter, immediately after the use of the curette.

Although intra-uterine applications, when properly made, and in the absence of contra-indicating factors, are rarely followed by ill effects, Engstrom<sup>21</sup> reports an instance where death followed shortly after the giving of an intra-uterine injection. Such cases were frequent enough in the past, when it was the custom to inject the non-puerperal uterus as a therapeutic means, and for this reason the introduction of medicinal agents on an applicator has been almost universally substituted.

Passing now to what may be fairly termed a novel method of treating endometritis, that by electro-chemical action. Apostoli,<sup>22</sup> with whom the method originated, has described it at length and with minute detail. This new method aims at utilizing, to the greatest possible degree, the chemical and trophic action of electricity in order to destroy the diseased endometrium and to exert a derivatory effect on the entire uterus. He was led to substitute electricity for the routine methods for the reason that the latter are slow in action and frequently fall short of effecting a cure. In utilizing the chemical galvano-caustic action locally, he lays stress on the necessity of sharply differentiating the effects of the positive

and the negative poles. In cases of endometritis, where hæmorrhage and leucorrhœa are marked symptoms, he connects the internal electrode with the positive pole and in reverse instances with the negative. His internal electrode is, in shape and size, like the average uterine sound; it is provided with a sheath of celluloid which thoroughly insulates the surface not in use; and the intra-uterine portion is constructed of platinum, an agent which is not corroded when the positive pole is the internal. For the external electrode, he uses soft, moist potter's clay, the mass being large enough to cover the entire surface of the abdomen in order that the current at the external pole may be disseminated over as wide a surface as is possible, which fact allows of the use of currents of great intensity without damaging the patient. Apostoli is in the habit of using from one hundred to two hundred and fifty milliamperes, the séance lasting from three to ten minutes, according to the sensibility of the patient. As regards the number of applications requisite, they have varied in his hands from three to thirty, according as the case was recent or chronic. These cauterizations, he claims, are very effective as regards results and he has never noted any untoward consequences. The method is not alone applicable to endometritis, but also to the hyperplastic condition of the whole uterus, of which it is such a frequent associate. Baraduc<sup>12</sup> has obtained marked results with this method of treatment, mainly in checking the discharges.

For the purpose of curetting the uterus and at the same time washing away the detritus, Abbott<sup>23</sup> has devised a combined curette and double catheter. The instrument enables one to

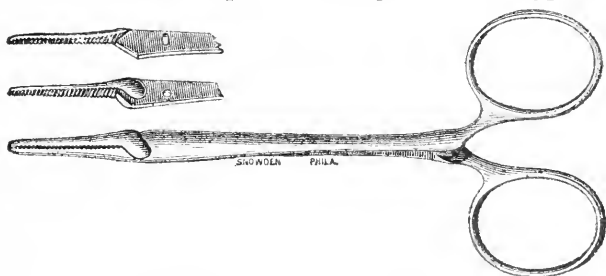


ABBOTT'S COMBINED CURETTE AND CATHETER.

thoroughly scrape the entire endometrium, since the curette portion may be turned in any desired direction and allow of antiseptic irrigation during the operation. The instrument is made of various sizes and with dull or sharp edge.

## STERILITY AND DYSMENORRHŒA.

The association of these topics here is purely a matter of convenience, for the reason that the measures of which we purpose to speak are often applicable to both conditions. A method much in vogue in the treatment of so-called obstructive dysmenorrhœa and sterility resulting from flexures or stenosis is that by thorough divulsion under an anæsthetic. Goodell has done much to popularize this method, owing to the excellent results it has yielded in his hands. The majority of gynecologists are inclined to consider this procedure in the light of an operation requiring anæsthesia and rest in bed. Wathen<sup>24</sup> favors this method and does not fear to dilate to a half inch in routine office practice. Ordinary steel-bladed expanding dilators are preferred for dilating purposes, but for those who prefer the conical graduated sounds, we would note that for the purpose of easy introduction Handfield Jones<sup>5</sup> has devised a convenient forceps. Having been disappointed in the



HANDFIELD JONES' UTERINE FORCEPS.

bladed dilators and the conical sounds, Reid<sup>25</sup> has devised a set of conical screws with a thread sharp enough to take its bearing on the walls of the cervix and yet so blunt as not to do damage by cutting. They are constructed in sizes varying from one-eighth inch in diameter at the point to one inch at the butt. He has



REID'S CONICAL SCREWS.

used these screws in a number of instances of dysmenorrhœa, and has found them more efficient and less painful than either bougies or steel dilators.

The serious inflammations which sometimes follow the use of tents as dilating agents are, in the great majority of cases due to the introduction of septic material through the abraded mucosa. Experience has shown that the so-called antiseptic tents, prepared by dry methods or by coating with some aseptic material, are entirely unreliable. Because of the many ways in which they may become contaminated, nothing will answer but the plan of keeping them in an antiseptic solution until they are to be used. Dirner<sup>26</sup> immerses them in a one-per-cent solution of mercuric bichloride in absolute alcohol contained in a wide-mouthed bottle. Fraipont<sup>27</sup> preserves them in a similar manner in a ten per cent. ethereal solution of iodoform. Neither of these fluids interfere with the prompt expansion of the tent when used. When introduced, the tent is taken straight out of the solution and passed into the canal of the cervix, the vagina having previously been disinfected. If the bichloride solution is used, hollow tents should be inspected and any crystals which may be found removed. No bad effects have followed the use of tents disinfected by these means.

In preference to mechanical dilating measures, Engelmann<sup>28</sup> favors electricity. He claims that this means is an absolutely certain one and leads in a most rational manner to an enlargement of the canal. He favors it on account of its direct electrolytic effects and employs it in a manner similar to that used in stricture in the male.

As a palliative means in the treatment of dysmenorrhœa, antipyrin has yielded us good results, the pain being stopped by fifteen-grain doses, repeated, if necessary, every twenty minutes until three doses have been given.

Whilst on the subject of sterility, it may be well to call renewed attention to the advisability of insisting upon examination of the male before subjecting the female to any operative treatment. Mundé has recently had two cases where absolute azoö-spermatism existed, in each of which the wife had been subjected to varied treatment before coming into his hands.

#### DISPLACEMENTS.

Graily Hewitt,<sup>15</sup> in studying the *etiology* of flexions of the uterus, finds the chief factors to be undue flexibility of the organ, the result of imperfect nutrition of its tissues, and forcible down-

ward pressure. The latter factor acts slowly, as a rule, but in a year or two it may convert a slight flexion into an aggravated one, provided the uterus remains abnormally flexible. Forcible downward pressure he has found to be at the bottom of retroflexion in fully one-half the cases in virgins, in whom the condition is very rarely congenital. There is no essential difference in regard to the manner in which the flexion becomes aggravated in antelexion and retroflexion, although there is in regard to their initiation, since the uterus is normally slightly antelexed. T. A. Emmet<sup>4</sup> reiterates his belief that a very common cause of displacements is pelvic inflammation, the degree being in general proportionate to the extent of the cellulitis. He also emphasizes the fact that loss of integrity of the pelvic fascia and of the connective tissue leads to displacements of the uterus. As regards symptomatology, it is the sagging of the uterus below what he terms the "health line," or its elevation above, which is an essential cause. This sagging of the organ necessarily makes traction on the suspensory ligaments, and certain of the ordinary means of treatment result in relief of the symptoms largely in that they lift the organ to its normal level in the pelvis, and thereby equalize the pelvic circulation.

In connection with symptomatology, Cameron<sup>25</sup> believes that pain does not emanate, in case of retroflexion, from pressure of the fundus upon the large nerves, as they lie in the posterior wall of the pelvic cavity, for they leave the pelvis through the large sacro-sciatic foramen. Pressure by concomitant exudation or by the fundus upon the branches of the sympathetic, on the anterior and lower surface of the sacrum, results, by reflex action, in pain. Vedeler<sup>29</sup> has reached a number of interesting conclusions in regard to the etiology, frequency, and symptomatology of retroflexion. He finds that from an anatomico-pathological standpoint the distortion is of no importance. In forty per cent. of the cases he examined, it gave rise to no symptoms, even where the flexion was present to the highest degree. It suggests itself, indeed, that in the vast proportion of cases it is rather the amount of sagging of the uterus than the mere fact of flexion which is the chief factor in symptomatology. Certain statistics offered by Ziegenspeck<sup>29</sup> are of interest, seeing that they are based on a series of post-mortems, many of the subjects of which he had had an opportunity to examine *intra vitam*. He believes that the pelvic floor is alone almost

sufficient to keep the normal anteflexed uterus in position. The elastic traction of the blood-vessels of the pelvic organs and of the peritoneum assist. The attachments of the uterus to the neighboring organs have only a subordinate influence. Pathological adhesions are a prime cause of displacements: thus of thirty cases of retroflexion, in not one did the cause of the deviation reside in the organ itself; and of seventeen cases of anteflexion, in fourteen parametritis posterior was determined. Large exudations in the pelvis he has found unaccompanied by change in the position of the uterus. Consecutive shrinkage, a later stage of the inflammatory process, causes change in position. From his investigations he is inclined to believe that pelvic peritonitis plays a lesser rôle in the etiology of displacements than does pelvic cellulitis,—a view which is considerably at variance with that toward which many gynecologists are to-day drifting.

Pinard and Varnier<sup>30</sup> have made a noteworthy contribution to the subject of retroversion of the gravid uterus. They call especial attention to the frequency and the rapid supervening of gangrenous cystitis in cases where the displacement is not speedily rectified; and in view of this fact it is advisable to empty the uterus at once of its contents in those instances where the routine measures of replacement fail.

*Treatment of Displacements and Flexions.*—For the relief of posterior displacements and of prolapse, Alexander's operation of shortening the round ligaments has claimed during the current year a greater share of attention than have other measures. Ashby<sup>31</sup> reaches the following conclusions in regard to the operation: The round ligaments are designed to hold the uterus in its axis in the pelvis, and to draw the fundus of the organ toward the symphysis pubis. They have little, if any, sustaining power in preventing procidentia, except in extreme degrees of descent, where the organ has escaped external to the vulva. Shortening of these ligaments is a practical method of lifting the uterus into its normal axis and of there retaining it; the operation, however, can prove of little value in case of procidentia, except when employed in conjunction with other methods instituted to overcome this form of displacement. The operation itself is easy of performance if one is familiar with the anatomy of the parts, and is devoid of risk if the ordinary safeguards are employed. These

views will doubtless prove acceptable to all who have tested the method, but it is well to add that the ligaments cannot always be found, and that if they are, it is not always possible to make them run, owing to pathological changes which have occurred in their neighborhood. Such criticisms have been made by Riazentzeff<sup>27</sup> from an experience in five cases of retroflexion, one of prolapse, and one of prolapse complicated with retroflexion, cystocele, and rectocele. In one case only one ligament was found and in two the result as regards replacement was negative. Fränkel<sup>32</sup> objects to the operation, believing that, not being unattended with danger, it is hardly admissible for an affection which does not threaten life. He admits only one case in which resort to it might be indicated, and this is when the retroversion or flexion is complicated with pronounced vaginal prolapse, and here with the view of avoiding the necessity of using a pessary to stretch the vagina, which has been contracted by the prolapsus operation. Kellogg<sup>33</sup> reports twenty-five cases of Alexander's operation, including a case of anteversion. He is not only generally satisfied with the effect of the operation on the displacement of the uterus, but has also found that where the ovaries were concomitantly displaced they were restored to their normal position and, in the majority of instances, stayed there. In case of retroflexion, Doléris<sup>33</sup> first overcomes the flexion by forcible dilatations and then shortens the ligaments; in prolapse he restores the uterus to a normal position, amputates the cervix if it is hypertrophied, performs anterior and posterior colporrhaphy and then shortens the ligaments. His aim in doing Alexander's operation is not to suspend the uterus, but to antevert it. Alexander<sup>33</sup> reports the results obtained in the eighty-four instances in which he has performed the operation. He has had one death from pyæmia and peritonitis. In retroflexion, 54 out of 58 cases were successful, as far as he is aware, in ultimate result. One of these cases had been pregnant twice, with no inconvenience and without any return of the retroflexion for which the operation had been performed. He admits that there is risk of hernia, and to guard against this, the external rings should be carefully closed and an abdominal belt worn for some time after operation. He believes that the operation is most likely to be successful in every sense of the term when performed for the relief of prolapse. In retroflexion the relief is sometimes

only partial. Reade<sup>31</sup> reports the following results from eight cases: two completely, and one almost cured; three considerably improved; in one no improvement at all; and one worse than before operation, as she now has a left inguinal hernia. The general conclusion which he has reached is the following: where the perineum is destroyed and the uterus markedly retroverted or prolapsed, so that it cannot be sustained by any safe pessary, he would consider it proper to shorten the round ligaments. He believes it to be a safe operation. In a discussion before the American Gynecological Society on this subject, Martin,<sup>33</sup> of Berlin, stated that he did not believe that an operation on the ligaments would surely retain the uterus in position unless an operation were also performed on the pelvic floor. Kelly thought it was folly to expect a heavy uterus to be held over a large open canal by two ligaments; he much preferred hysterorrhaphy. Trenholme had not been very successful in the operation and recalled the fact that an able anatomist had been unable to find the round ligament in eight out of twenty-seven dissections.

Pozzi<sup>1</sup> reports an instance of the operation where, at the end of four months, the uterus was in good position. Bouilly<sup>34</sup> records a similar result after ten months.

Mundé has performed the operation sixteen times and feels that he now, with increased experience, can always be reasonably certain of finding the ligaments. He thinks that his early failures in detecting them were due to the misleading directions given by the author of the operation. He has found that by carefully locating the pubic spine, cutting directly down upon the bone with one sweep, so as to expose the external ring, and picking up with forceps the tissues which present between the pillars of the ring, the terminal fibres of the round ligament will always be grasped. Gentle traction outward will speedily reveal the tendinous sheath of the ligament. Labored dissection is more likely to mislead than to help the search. The results of the operation have, in his experience, been exceedingly satisfactory, the uterus being supported and anteverted in all of the cases which have remained under observation. A lever pessary was generally worn for several months as a precautionary support. The combination of Alexander's with other operations designed to restore the normal condition of the uterine supports, has given particularly beneficial



results; thus he has a number of times performed trachelorrhaphy, Stoltz's operation for cystocele, Hegar's for colpo-perineorrhaphy, and Alexander's at the same sitting, in one case even a vesicovaginal fistula operation in addition, all with complete success. To attempt to retain a prolapsed uterus in its normal position by Alexander's operation alone, with no aid from procedures designed to restore the vagina and perineum, seems to him irrational.

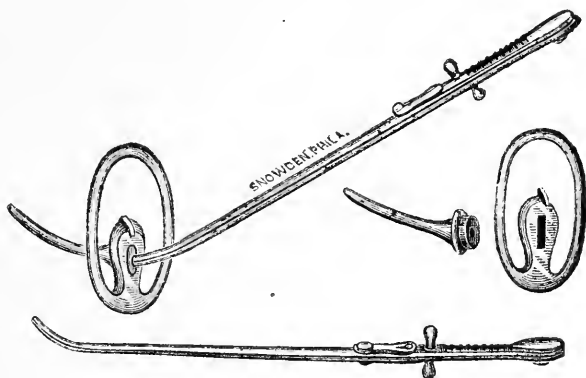
In the case of the adherent retroflexed and retroverted uterus, Polk<sup>1</sup> has suggested and performed a combination of laparotomy for the purpose of loosening the organ and of Alexander's operation for maintaining it in position. His belief is that in such instances the symptoms are in great part due to the fact that the uterus and adnexa, being bound down to the floor of the pelvis by the adhesions, cannot functionate properly, and that therefore the loosening of these adhesions and the lifting up of the organs to a higher level, will equalize the circulation through and around them and thus greatly palliate, if not entirely cure the symptoms. In two instances he supplemented the laparotomy by Alexander's operation, and at the time of the report he was fully satisfied with the results. He believes, however, that hysterorrhaphy, or attachment of the fundus to the abdominal wound, would be preferable to Alexander's method, since the abdomen is already open and the procedure hence more direct. Hysterorrhaphy has been suggested by Kelly<sup>4</sup> in case of intractable retrodisplacement and prolapse. After breaking up any adhesions which may exist, the fundus is to be attached to the abdominal wall by means of suspensory sutures passed through the cornua. He believes that this procedure should form the concluding step of every operation upon the appendages where the uterus has been long retroflexed. He has resorted to the method in a recorded case. He utilizes both cornua, an interrupted or several continuous sutures being passed through each, and the fundus is attached on either side of the incision at points distant from it a little more than half the transverse breadth of the body. In cases of prolapsus, he urges that the whole reliance be not placed upon hysterorrhaphy, but that it be preceded by one or another vaginal operation aiming to assist in the prevention of further prolapse. He believes that hysterorrhaphy possesses great mechanical advantage over Alexander's operation, especially in instances of prolapse.

In these instances of adherent retro-displaced uterus, Schultze<sup>25</sup> advocates stretching and loosening by vagino- and recto-abdominal manipulation. He insists on the possibility of thus, in many instances, not only releasing the uterus, but also the ovaries, in case they are coincidentally bound down. This procedure he also claims is free from risk, and is to be sharply differentiated from forcible stretching and reposition. The adhesions are loosened and severed by pressure through the combined fingers. Anæsthetization is requisite, and Schultze has succeeded, he tells us, hundreds of times, neither recurrent inflammation, hemorrhage or shock having followed the manipulation. Notwithstanding this claim, we are inclined to think the risk not less than that involved in laparotomy.

Coe<sup>1</sup> believes that old intra-pelvic adhesions cannot be stretched by continuous pressure applied through the vaginal vault by means of tampons, claiming that the chief effect of such treatment is to deepen the fornix and to lift the uterus and rectum together upward, increasing any retroflexion, but not stretching the adhesions. These deductions, which are at variance with the views of the majority of the profession, are the result of his clinical experience and of many tests on the dead body.

In connection with the mechanical means of treatment of uterine displacements, Donaldson<sup>4</sup> has devised a retroversion stem pessary applicable in particular to instances where, owing to lack of development of the uterus and the vagina, there is not sufficient depth of cul-de-sac to enable a lever pessary to act efficiently. In connection with the description of this instrument, and as applicable to stem pessaries in general, stress is laid on the strict necessity of careful preparation of the patient before inserting the stem in order to establish uterine tolerance, and on the prompt removal of the stem on the inception of pain. These precautionary measures, together with strict antisepsis and the maintaining of free drainage by having the instrument grooved, are deemed essential in order to guard against the accidents which not infrequently supervene on the use of stem pessaries. A new intra-uterine stem pessary and introducer have been devised by Gordon Black.<sup>5</sup> The oval end of the stem fits into the basic support by an oval socket, thus providing against rotation of the stem. It is fitted with a gold bolt which fixes the two portions of the instrument at the pleasure of the operator, and enables him to introduce

and remove it in separate parts. The point of the introducer is first passed through the oval aperture in the support, and is then made to enter the round hole at the lower end of the stem. Here



GORDON BLACK'S STEM PESSARY.—(*British Medical Journal*.)

it is jammed by a simple movement, so that the stem is held fast until it is safely fixed in the support; it is then released by a backward slide of the blades.

The usefulness of, and the risks arising from intra-uterine stems, have received the usual amount of attention during the current year. The views expressed are as variable as those always characterizing any discussion of this instrument. The space at our command is utterly inadequate to allow us to sift these views with any degree of justice to the various writers. Routh<sup>36</sup> reaches a number of conclusions in regard to the treatment of uterine flexions which may be summarized as follows: In case of narrowing or obstruction of the canal at the point of flexion, an intra-uterine stem is essential, but the precaution is necessary that it be not long enough to touch the fundus; if the flexion be great, a stem attached to the buckle pessary known by his name should be used; stems, with or without the buckle, should be worn for at least six to eight months; in case of great subinvolution of the uterus, a thick stem is essential; in case of moderate adhesions, a spring pessary will gradually, by its resilience, replace the uterus. Where the precautions generally insisted upon are faithfully taken, the stem in his hands has not proved a dangerous instrument. Similar views have been held by Meadows and Heywood Smith;<sup>36</sup> whilst Mansell-Moullin<sup>36</sup> and Fitzgerald<sup>36</sup> believe the stem should only be resorted

to after all other methods had failed, the latter stating that his experience was limited to cases in which he had had to remove the instrument in consequence of the inconvenience and of the inflammation it caused. Reeves Jackson<sup>37</sup> favors resort to the stem in the treatment of dysmenorrhœa. He never uses the instrument unless the flexion is the cause of this symptom, and uterine tolerance is carefully and systematically ascertained by the introduction of the sound before the stem is inserted. He rejects it, even as most gynecologists will, in instances where there is manifest evidence of inflammation of the uterus or of its surroundings. As a proof of the occasional immunity against accident from prolonged wearing of an intra-uterine stem we would note an instance reported by Bailey<sup>38</sup> where one was worn for thirty years. On attempted removal, the uterus was completely prolapsed.

In patients who have passed the menopause and are affected with partial or total prolapse of the uterus, it is often a vexed problem how to palliate the symptoms. Operative measures will, of course, generally answer, but many patients refuse to submit to such measures. Whilst many pessaries have been devised for use in these cases, there is scarcely any which is more than temporarily effective. Byrne<sup>4</sup> offers us an instrument which he says answers perfectly, particularly where, although there is great relaxation of the vaginal wall, the perineum is sufficiently intact to yield support to the instrument. Beatty<sup>39</sup> reports a case where a large wedge-wood ball pessary was inserted for the relief of prolapsus and had been retained for fifteen years, at the end of which period he had been consulted on account of fetid discharge and had enucleated the instrument.

Wylie<sup>40</sup> has been long convinced that the pessary fails to cure, being purely a palliative means. He claims that it is a mistake to regard simple displacement of the uterus as a disease and rather aims at relieving associated diseased factors. In place of the pessary he advocates cotton dipped in a solution of boro-glyceride (3j. boro-glyceride to Oj. of glycerin), to which he adds 3j. of alum if an astringent effect is desired; with this he supports the uterus. He thus equalizes the pelvic circulation and relieves congestion by the depletant effect of the glycerin. The routine use of this measure has enabled him to dispense almost entirely with other pessaries.

Engelmann<sup>4</sup> also advocates the substitution of the tampon for the pessary.

Well prepared sheep's wool makes the best supporting tampon; it causes scarcely any irritation, and retains its elasticity—factors which make it superior to the absorbent cotton generally used.

In connection with the subject of prolapsus, we refer to an operation strongly recommended by Reamy<sup>39</sup> for the cure of the associated rectocele. Fig. 1 represents the shape of the denuded surface on the posterior wall. The arms at the upper part extend well up to the sides of the cervix in the lateral culs-de-sac of the vagina. He uses catgut for the vagina because of the difficulty in

Fig. 1.

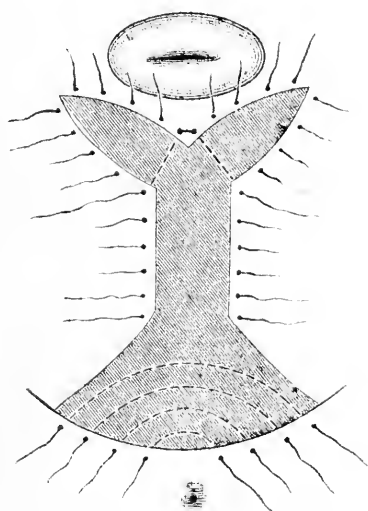
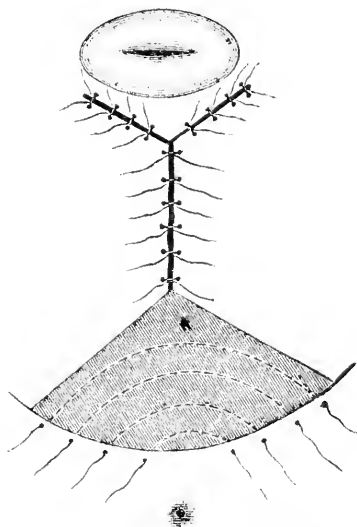


Fig. 2.



REAMY'S OPERATION FOR RECTOCELE ASSOCIATED WITH PROLAPSUS.—(*Medical News*.)

removing either silk or wire over the freshly united perineum. The suture marked with a cross is of great importance; it should be introduced about one-fourth of an inch from the border of the denudation in the angle made between the denuded tract on the posterior wall and one of the denuded arms. It is carried across the denudation, as indicated by the dotted line, and is brought out in the undenuded apex behind the cervix. It is then re-introduced in the apex about one-fourth of an inch from its point of emergence, carried across the other denuded arm in the direction of the other dotted line, and brought out at a point in the opposite angle between the lateral arm and the posterior tract corresponding to the

point of entrance. When this suture is tied across the upper part of the posterior denuded tract, the three angles are brought together. In Fig. 2, all the vaginal sutures have been tied. For the perineum he uses silver wire, the upper sutures being carried across high up, about on a level with the lowest suture inside the vagina, so as to secure perfect coaptation of the edges as shown in the cut.

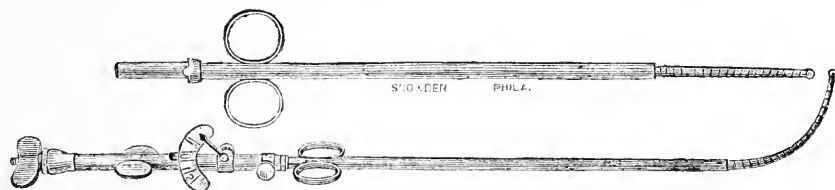
In regard to the ultimate result of prolapsus operations, Cohn<sup>20</sup> reports that out of a hundred and five operations, fifty-seven per cent. remained permanently cured. He favors the employment of the uninterrupted catgut suture as almost absolutely insuring primary linear union.

A number of interesting cases of inversion of the uterus have been reported during the year. Jaggard<sup>40</sup> records an instance of twenty months' standing which he was able to reduce by colpeurynter after thirty-three days. The colpeurynter was introduced so that it lay on the posterior vaginal wall and when distended made pressure on the fundus in the direction of the axis of the pelvic inlet. Pettit<sup>23</sup> reports an instance of eighteen hours' duration, where reduction was effected in twenty minutes through resort to Noeggerath's method. This method consists in indentation of one cornu first, assisted by counter-pressure over the ring of inversion from above the pubes. Le Fort<sup>41</sup> records a case of chronic, irreducible inversion in a woman of twenty-two, where he successfully amputated by means of a rubber band wound several times around the base. Brewis<sup>38</sup> saw an instance of spontaneous inversion where reduction was effected through the free use of a stream of hot water directed against the inverted portion. The explanation of the action of the hot water is, that by setting up contractions of the muscular fibers of the uterus, the organ is lessened in size, the blood supply being diminished. While the hot douche was being given in this case, he noticed a distinct hardening and lessening in bulk of the inverted uterus.

Runge<sup>21</sup> has reported a case somewhat similar to Jaggard's in that the colpeurynter was the means successfully used.

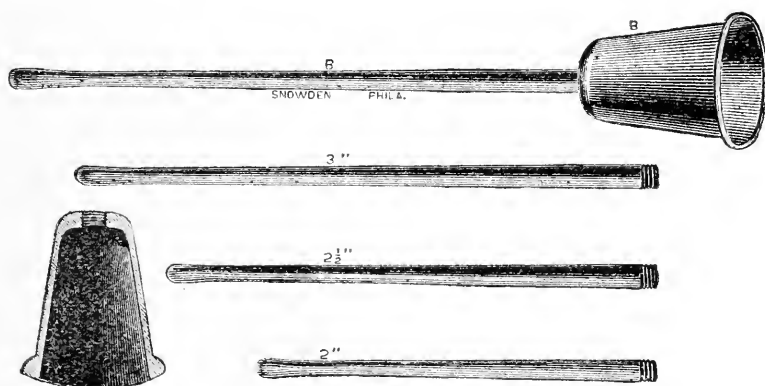
Of instruments occasionally of utility in case of uterine displacements, White's<sup>42</sup> repositor may be mentioned. The reposition of the uterus is effected by operating the governing screw at the handle, the instrument being held steadily in place. The

spiral extremity of the instrument is graduated to the depth of the normal womb, is flexible and made to follow easily any curve of the uterine canal, its direction and degree of curvature being recorded on the dial. By means of this instrument, White claims that long-standing flexion may be successfully reduced. Miller<sup>2</sup>



WHITE'S REPOSITOR.—(*Pacific Med. and Surg. Journal.*)

has devised a "thimble sound" which artificially elongates the index finger and which he uses as a repositor. The advantage of this sound is that the uterus, being on the tip of the operator's finger, is completely under his control, and that the force employed can be fully appreciated.



MILLER'S THIMBLE SOUND.—(*Pacific Med. and Surg. Journal.*)

#### NEW GROWTHS OF THE UTERUS.

*Histological.*—Heitzmann<sup>4</sup> has made a series of valuable studies which bear on the diagnosis of tumors of the mucous membrane of the uterus. Of special importance are his conclusions in regard to sarcoma and cancer. The former in its stage of invasion, particularly, simulates clinically fungous endometritis, and a diagnosis can only be reached microscopically when the epithelia of the tubular glands have become disintegrated by the new growth. The epithelia of the utricular glands are trans-

formed into sarcoma corpuscles either by a process of division or else through coalescence into granular protoplasmic masses. In case of cancer, the utricular glands are not directly changed into cancer nests, but the epithelia of these glands first break up into medullary corpuscles or else into larger masses of protoplasm from which the cancer epithelia originate. Adenoma and papilloma of the mucosa are rare, the former occasionally, in its early stages, simulating fungous endometritis, and being characterized microscopically by the presence of a varying number of tubular utricular glands with columnar ciliated epithelia not always unbroken. Klotz<sup>29</sup> has met with an instance of what he terms "deciduoma" of the uterine cavity. This term is applied for the reason that it consisted of the same elements as the decidua serotina, and the explanation for its occurrence which suggests itself as most plausible to him is that a fructified ovum which had soon died had acted as an irritant of the mucous membrane. Clinically, the growth was accompanied by profuse hæmorrhage. From an examination of over twenty specimens Wyder<sup>29</sup> concludes that in subserous and interstitial myomata there exists a concomitant glandular endometritis which is the more pronounced in degree the thicker the uterine wall separating the tumor from the uterine cavity. The thinner the wall, especially in case of submucous myomata, the more likely the coexistence of an interstitial endometritis. From these researches the statement is justifiable that glandular endometritis does not predispose to malignant degeneration. The tendency of the present day to seek for the causes of disease in microbes has even been extended to fibroid tumors of the uterus. Gallippe and Landouzy<sup>33</sup> have discovered in two fibromata of the uterus micro-organisms which they suggest act as irritants and thus lead to proliferation of connective tissue. This view is, of course, the veriest hypothesis, but investigations in this direction might confirm it, even as in many other affections. The genesis of cystoid tumors of the uterus is in dispute. Müller,<sup>29</sup> in an examination of four extirpated cases, found a similarity in structure to cystic lymphangioma.

*Fibroids.*—The following cases are worthy of special reference. Skutsch<sup>26</sup> records an instance where a large subserous myoma, through torsion of its pedicle, had rotated the uterus through an angle of 180°, that is to say, the pedicle sprang from



the posterior surface of the organ and the torsion had caused this surface to present anteriorly. Instances of this nature are rather rare. Kötschau<sup>26</sup> has described a case where an interstitial myoma caused eversion of the mucous membrane of the organ, the fundus being to a slight degree inverted. He was able to find only a single analogous case on record. Although spontaneous expulsion of a uterine fibroid is not of infrequent occurrence, we would refer to Johnston's case,<sup>4</sup> where the tumor weighed two and a half pounds, the largest which has been reported. Joulin<sup>10</sup> reports a case where a fibroid polypus, pediculated from the posterior wall of the cervix, by compression on the ureters, caused albuminuria associated with cardiac symptoms. Removal of the polypus resulted in disappearance to a great degree of these symptoms.

*Treatment.*—A method of treatment applicable to fibroids which, in the hands of many observers, has yielded good results, is that by the injection of ergot or of ergotin. Bumm,<sup>26</sup> after considerable experience, formulates a number of precautions against the untoward results which not infrequently occur from resort to the method. The proper site for making the injections is, he claims, into the nates and not into the abdomen. The needle should be plunged, perpendicularly, deep into the gluteal muscles. From a number of experiments on rabbits, he has found that absorption from muscle takes place within twelve hours, whilst when the ergotin is injected into the subcutaneous tissue, from twenty-four to forty-eight hours are requisite. When the injection is made as recommended and a five to ten per cent. neutral watery solution of ergotin is used, there is little likelihood of causing irritant effects, and should these ensue they will be trifling. Granting that, by strict attention to these rules, abscesses are unlikely to follow on resort to subcutaneous injections, it still remains true that the method is exceedingly tedious, and that we cannot predicate in any individual case even palliation of the symptoms. Lately, electricity has been advocated so strenuously by a large number of observers, and the reported results are so excellent, that the hope may well be expressed that in this agent we possess a means both less radical and less dangerous than the ordinary surgical methods, and at the same time as palliative as regards the chief symptoms, even if it do not lead to complete disappear-

ance of the growth. Contributions on this subject have appeared from Cutter,<sup>4</sup> Apostoli,<sup>5</sup> Woodham Webb,<sup>6</sup> Martin,<sup>11</sup> Elder,<sup>13</sup> Smith,<sup>14</sup> Steavenson,<sup>15</sup> Playfair,<sup>16</sup> and numerous others, which not only prove the interest taken in the subject, but generally vouch for the value of the method. There are two methods of utilizing electricity, the one aiming primarily at causing complete disappearance of the tumor, and the other at palliation of the chief symptoms and secondarily at causing diminution in size. The first method, the early advocates of which were Cutter and Kimball, has yielded in their hands the following results in a series of 50 cases: In 11 instances, cure; in 25, arrest of the growth; in 3, relief of the symptoms; in 4, a fatal result; in 7, the growth was not arrested. The essential point in this method consists in the insertion of the two electrodes into the tumor, the direct electrolytic effect of the current being sought. In the second method, of which Apostoli was the early and is still the most ardent advocate, puncture of the tumor is avoided, the intensity of the current being localized within the uterus with the end in view of bringing to bear the cauterizing property of electricity on the endometrium and of indirectly modifying the nutrition of the tumor. Almost all observers who have tested this method lay stress on the absolute necessity of sharply differentiating the pole which should be chosen in any special case as the internal. The rule is to select the positive pole as the internal in all cases where menorrhagia, metrorrhagia or profuse discharge are accompaniments of the fibroid, for the reason that the negative pole tends to increase the hæmorrhages. High intensities, 200 and more milliampères, are deemed essential in order to obtain the best results. Resort to such high intensities is made possible by dispersing the current at the external pole over as wide a surface as is possible. This is accomplished by covering the abdomen with a large electrode, made of pliable potter's clay according to Apostoli's preference, or of pliable metal or sponge. It appears to be an indifferent matter as to the material of which this electrode is constructed, provided the main aim is secured, to cover as large a surface as possible. In case it is impossible to introduce an electrode into the uterus, Apostoli makes an opening into the tumor, per vaginam, by means of the negative pole and the tumor is thus influenced by the caustic derivative effect of this pole. For this purpose Steavenson has devised a

convenient electrode. The method has the advantage over the former that puncture involving the peritoneum is not requisite, but it falls short of the former in that it does not cause disappearance of the growth. Mundé has had two cases treated by this method



STEAVENSON'S ELECTRODE.—(*British Medical Journal.*)

where there was practically an entire cure, all symptoms having disappeared. The majority of patients, however, are satisfied with palliation of their troubles, and it is significant of the strong impression made by Apostoli's method, to find the elder Keith<sup>5</sup> making the statement that it is criminal to resort to hysterectomy before testing electricity. The exceptionally low operative mortality obtained by this operator renders it all the more noteworthy that he has reached the above conclusion, but it is a natural one, seeing that in all the cases in which he had tested the method the menses had become almost normal, the tumors had been reduced in size and all pain had gone. In one of his latest reports on the method, Apostoli<sup>44</sup> states that he has employed it in 278 patients with fibromas or hypertrophy of the uterus in some manifest degree, necessitating altogether 4246 applications of the constant current, and that in ninety-five per cent. benefit has been acknowledged. He further claims that the mortality from the treatment, provided it be adopted in its integrity and worked as it ought to be, will be practically *nil*. The internal electrodes used by Apostoli are constructed of platinum insulated by celluloid except at the intra-



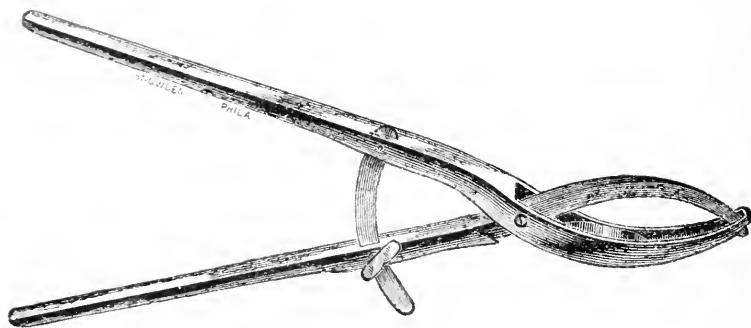
APOSTOLI'S NITRA-UTERINE ELECTRODE.—(*British Medical Journal.*)

uterine portion. Steavenson<sup>5</sup> has had them constructed of copper wire insulated to two inches of the extremity by soft India rubber, this extremity being of platinum. The result is greater flexibility.

Passing now to the operative treatment of fibroid tumors of the uterus, we will first consider hysterectomy after abdominal section in connection chiefly with the point in regard to which there is greatest divergence of opinion.—the proper method of treating the

pedicle. Although, toward reaching a solution of this question, deductions from statistics are faulty, seeing that so much depends on individual expertness, the data at our disposal point rather to the conclusion that the extra-peritoneal method is to be preferred. Bantock,<sup>4</sup> in advocating the extra-peritoneal method, records 72 cases with 12 deaths; Fehling,<sup>45</sup> 11 cases with one death; Dirmer,<sup>26</sup> 17 with 2 deaths, whilst of 8 cases treated intra-peritoneally 4 died; Braun,<sup>46</sup> 38 hysteromyomiotomies treated extra-peritoneally with a mortality of 15.5 per cent.; Martin, as reported by Orthmann,<sup>32</sup> 84 cases treated intra-peritoneally with 25 deaths. The risks from the intra-peritoneal method of treating the pedicle are hæmorrhage and sepsis, and both of these are markedly lessened by the extra-peritoneal method, at least such is the claim of its advocates. Convalescence, however, is more protracted after the latter than the former; in Keith's<sup>5</sup> cases, for instance, the average time in the extra-peritoneal instances being forty-one days, and in the intra-peritoneal three weeks. This operator, it should be stated, has not had a death either in hospital or private practice from the intra-peritoneal method, and he is convinced that it is the best method.

Eastman has devised a clamp which is said to possess certain advantages over others in use. Its construction is simple and it is not at all likely to slip. It will crush a large pedicle as readily as a small, and where the pedicle includes the uterus at the internal os, it clamps it so as to reduce the mass more than one-half.



EASTMAN'S CLAMP.—(*Canadian Practitioner*.)

In connection with hysterectomy for fibroids, a number of interesting cases have been recorded. Cabot<sup>1</sup> has reported an instance of pyelitis, the result of obstruction from a fibroid firmly

wedged in the pelvis, where hysterectomy was followed by relief; Foreman<sup>47</sup> records an instance where the weight of the removed mass was 38 pounds; Knowsley Thornton<sup>21</sup> reports a case of special interest from the fact that the tumor appeared first at about the menopause, and grew so rapidly after its accomplishment as to threaten the patient's life; W. Karstrom,<sup>48</sup> in an instance of gravidity at the fifth month, complicated by an intra-ligamentous fibroid causing pressure symptoms, attempted to enucleate the tumor and the hæmorrhage was so profuse that hysterectomy was necessitated. The patient recovered and the weight of tumor and uterus, without the foetus and placenta, was over 39 pounds; Knowsley Thornton<sup>21</sup> reports a case where the fibroid weighed over 26 pounds, and Dawson<sup>4</sup> an instance of fibro-cyst where the weight was 27 pounds.

In instances where the fibroid is accessible per vaginam, removal by that channel is to be recommended. Chambers<sup>1</sup> advocates the following method as preferable to that by the *écraseur* or galvano-cautery wire, his principal objection to the latter methods being that the operator can rarely feel thoroughly satisfied that he is removing the tumor alone, and not a portion of the uterus. The tumor is grasped by a large volcellum and a wedge-shaped piece is cut out of it with strong, sharp-pointed scissors, the procedure being repeated until the pedicle is apparent. During these manœuvres, if there is much hæmorrhage, the pointed blade of the Paquelin cautery is plunged into the body of the tumor in various directions and the hæmorrhage thus checked. When the mass has been sufficiently diminished, slight traction will deliver the remainder through the vulva and the pedicle may be cut by the scissors or the spoon saw.

The subject of enucleation of uterine myomata has been considered at length by Kleinwächter<sup>49</sup> and the conclusions reached are the following: The indications for resort to this method in preference to one or another of the methods after laparotomy are: In case of cervical myomata and of submucous or interstitial growths which project in part into the vagina and where the size is not too great to constitute of itself an obstacle to enucleation by this route. The unfavorable results formerly obtained from enucleation by the vagina are considered due to the fact that one or another of the following conditions were violated: The tumor was

too large to be enucleated without considerable effort; the tumor, especially when interstitial, did not project sufficiently into the uterine cavity, that is to say, the capsule was thinner towards the peritoneal layer of the uterus than towards the mucous layer; the operation was resorted to in the presence of only slight dilatation of the cervix, or immediately followed upon operative dilatation. When the tumor is not too large, is covered by a thin mucous layer, and the cervix is dilated, Kleinwächter believes that the prognosis of enucleation per vaginam is good, while in certain instances, further, the operator is able to materially better the prognosis, as where there exists a tendency to spontaneous expulsion, that is to say, where uterine contractions are present. Here the long-continued administration of ergot assists the efforts of nature, the cervix dilating and the tumor becoming more accessible. Enucleation at separate sittings is condemned as simply a method of courting sepsis. In regard to the statistics of vaginal enucleation, Lomer, in 1881, collected 130 cases with a mortality of 18. Kleinwächter has collected 17 additional cases, and the mortality from the 147 is 22 (14.96 per cent.). He believes that, were the cases sifted from this number where enucleation by the vagina should not have been attempted, the mortality rate would be far lower. He records two successful personal cases.

(For castration in case of fibroids see Oöphorectomy.)

*Fibro-Sarcoma*.—Da Costa<sup>1</sup> records a case of extremely rapid development of a fibro-sarcoma of the uterus. The patient had suffered from villous endometritis with menorrhagia and had been curetted. Some time later he successfully removed from the posterior wall a fibro-sarcoma, three inches long by two inches thick, which had grown in thirty days.

*Carcinoma—Etiology*.—Huber,<sup>5</sup> in questioning the relationship of malformations to new growths, describes the case of a multipara who died from carcinoma of the cervix. No genital abnormalities were suspected during life, but at the autopsy a very marked uterus bicornis with double vagina was found. There is no evidence to show that a bicornate uterus should or should not be more subject to malignant degeneration than a normal one. Nevertheless the frequency with which malformations are overlooked in cases like the above is very singular. Valot<sup>50</sup> records an instance of that rare condition, carcinoma strictly limited to the

uterine mucosa. The diagnosis was confirmed by microscopical examination after a successful hysterectomy. The symptoms were hæmorrhages, pain, and reddish-white, fetid discharge. The cervix was unchanged and the body of the uterus but very slightly increased in size.

Eckhardt<sup>29</sup> reports an instance of carcinoma of the cervix in a maiden of nineteen, the only other recorded instances under the age of twenty being by Beigel at nineteen, by Glätter at seventeen, by Schauta<sup>49</sup> at sixteen, and by Rosenstein at two years of age. Mundé<sup>4</sup> records a case of epithelioma of the posterior vaginal fornix in a virgin of twenty-three. In Eckhardt's case the carcinoma was thought to have developed from the cervical mucous membrane which showed very markedly the condition of glandular hyperplasia already described under *cervical lacerations*. What condition of chronic irritation had caused this increase in the glandular elements could not be decided. It is noted that, as a general rule, carcinoma is more malignant in young than in older subjects.

Williams<sup>21</sup> considers that cancer as met with in the vaginal portion, in the cervix proper, or in the body of the uterus, originates in these localities and does not invade them by extension. In his experience, child-bearing did not seem to be an etiological factor, neither does he accept the view that the disease is often the sequence of cervical laceration, for in the cases he has met with, the trouble did not primarily begin in the laceration or in the everted surface of the lips, but in the deeper glands of the part, a layer of non-cancerous tissue being often seen between the disease and the surface. This latter proposition we entirely agree with, but consider with Cushing<sup>1</sup> that the glandular hypertrophy which precedes the cancer is, in a very large proportion of cases, brought about by the presence of a laceration. The clinical evidence that laceration predisposes to cervical cancer is very strong, and, taken with the recent histological investigations mentioned, is most convincing. We agree perfectly with Goodell<sup>51</sup> when he states that there is scarcely an exception to the rule that cancer of the cervix appears only in women who have borne children or have suffered some equivalent injury to the cervix, as, for instance, that caused by the passage of a large fibroid.

*Diagnosis.*—It has recently become possible to state definitely that carcinoma of the uterus is sometimes curable and this possi-

bility renders its early recognition of the most vital importance. The early symptoms are so slight that patients rarely seek medical advice until the disease is well established, hence we rarely see carcinoma in its beginning stage. The objective changes are also usually slight. Ruge and Veit believe that beginning carcinoma cannot be certainly diagnosed by clinical observation, though suspicions may be aroused which the microscope may confirm. Owing to these frequent microscopical examinations in suspicious cases, the naked-eye appearances are becoming gradually better known, and Stratz<sup>35</sup> in a recent valuable paper describes three typical forms:

(1) A slightly excoriated surface, rough to the touch and readily bleeding, sharply defined from the surrounding healthy tissue. The surface is granular, and of a yellowish-red color.

(2) A swollen, dark red proliferation of one lip, extending into the external os, very readily bleeding and sharply defined; slight yellowish discoloration; granular surface only at certain points.

(3) Broad, pale, yellowish-red excoriation, sharply defined from surrounding mucous membrane, which is slightly inflamed at border; very faint granular appearance; whole surface bleeding readily. The whole of the malignant area is on a deeper level than the remaining part of the cervix; the border of the normal tissue is somewhat hard to the touch.

The points which he holds to be characteristic of cervical carcinoma are:—(1) Sharp definition at all points from the healthy tissues; (2) a difference in level between the diseased portion as a whole and the healthy parts; (3) a slightly yellow color of the cancerous portions, and (4) the appearance of yellowish-white, glistening, granular bodies over the whole or a part of its surface.

Any slight hæmorrhage or increase in menstrual flow in an elderly parous woman, either *with or without pelvic pain*, should cause us to consider the possibility of cancer.

*Medical Treatment.*—The general uselessness of alveloz, condurango bark, and Chian turpentine, except as palliative agents, seems to be pretty thoroughly established, though Clay,<sup>52</sup> whose father in 1880 first brought Chian turpentine prominently before the profession, insists that, when properly and persistently used, it will in many cases produce an entire cure, early treatment and the use of the pure drug being essential.



Cordes<sup>30</sup> has called attention to the value of pure terebene in the palliative treatment of advanced cases of cancer of the cervix. He first disinfects the vagina, then tampons the affected surface with cotton saturated with equal parts of terebene and some bland oil, holding these in place with a large dry plug, and only removing the dressing every second or third day. In his hands this treatment has yielded the most marked results, lessening pain, hæmorrhage, fetor, and discharge.

*Surgical Treatment.*—The advances in the surgical treatment of uterine cancer during the past year have all been in the direction of improved technique and more strictly defined indications for vaginal hysterectomy. This operation, recently looked upon as one of too great a mortality and too little permanent relief to be justifiable, has now been accepted by the great majority of the profession as an entirely legitimate and practical procedure.

Of its opponents, Tait<sup>19</sup> considers that it is “absolutely indefensible” on account of its high primary mortality and that “the disease seems to return after it with special virulence and suffering.” Jackson<sup>31</sup> considers that “vaginal hysterectomy does not avert or lessen suffering; it destroys and does not save life. It is, therefore, an unjustifiable operation.” Williams<sup>21</sup> holds that high amputation gives better results when the disease is limited to the cervix, and that hysterectomy should be reserved for those cases where the body is involved. Goodell<sup>51</sup> favors the operation of curetting or high amputation, claiming better ultimate results. These objections can be best answered by showing the results recently obtained.

In Post's<sup>53</sup> first paper in 1886, the number of cases reported was 341 with a mortality of 93, *twenty-seven per cent.*; in the second in 1887<sup>4</sup> the number, including those collated by Dudley,<sup>17</sup> was 381 with a mortality of 77, *twenty per cent.* In 65 additional cases by twenty different operators (see table) published in 1887 and not included in the above, the mortality was only 7, *ten and seven-tenths per cent.*

Of individual operators, Brennecke<sup>35</sup> has done 21 operations without a death; Schroeder and Hofmeier,<sup>35</sup> 40 with only 3 deaths; Fritsch,<sup>54</sup> 60 with 7 deaths; and Martin,<sup>3</sup> 66 with 11 deaths. In the 24 last reported cases of Fritsch, there were only 2 deaths. These figures show a rapid and most encouraging decrease in the

primary mortality from the operation which in this respect will now compare favorably with the results obtained by laparotomy in general.

| OPERATOR     | REFERENCE                    | CASE. | DIED. | RECOV-<br>ERY. |
|--------------|------------------------------|-------|-------|----------------|
| Antona       | Lancet                       | 6     | 2     | 4              |
| Brathwaite   | Lancet                       | 2     | 0     | 2              |
| Conerrell    | Brit. Med. Journal           | 1     | 0     | 1              |
| Dolérès      | Bul. de la Soc. Anat.        | 1     | 0     | 1              |
| Etheridge    | Jour. Amer. Med. Assoc.      | 4     | 0     | 4              |
| Jennings     | Lancet                       | 1     | 0     | 1              |
| London       | Cent. E. Gyn.                | 1     | 0     | 1              |
| Nairne       | Brit. Med. Jour.             | 1     | 0     | 1              |
| Purcell      | Lancet                       | 1     | 0     | 1              |
| Reamy        | Clin. Lancet-Clinic          | 3     | 0     | 3              |
| Richelot     | l'Union Méd.                 | 7     | 0     | 7              |
| Rohmer       | Brit. Gyn. Jour.             | 1     | 1     | 0              |
| Saenger      | Personal letter to Dr. Post. | 10    | 1     | 9              |
| Smith, Greig | Lancet                       | 1     | 0     | 1              |
| Stirling     | Anstr. Med. Jour.            | 1     | 0     | 1              |
| Terillon     | Bul. de la Soc. Anat.        | 1     | 0     | 1              |
| Thompson     | Med. Record                  | 2     | 1     | 1              |
| Vernuil      | La Semaine Méd.              | 19    | 2     | 17             |
| Wackerhagen  | N. Y. Med. Jour.             | 1     | 0     | 1              |
| Worrall      | London Med. Rec.             | 1     | 0     | 1              |
| 20 Operators |                              | 65    | 7     | 58             |

Per cent. of mortality, 10.7-10.

The most recent investigations of the probability of permanent freedom from recurrence or of freedom from recurrence for a sufficiently long period of time to make the operation of benefit show a most gratifying result. In Fritsch's sixty cases there had been no recurrence in two at the end of three years; in seven, at the end of two years; in seven, at the end of one year; and in three, at ten months. Comparing these results with the statistics obtained by Volkmann in 131 cases of mammary carcinoma, Fritsch concludes that probably in seven cases, and certainly in two, cure has resulted, while in the remaining ten recurrence is not likely, since the seventh month, the time when this ordinarily occurs, has been passed. Of twenty-six of Leopold's cases<sup>29</sup> eighteen remained healthy for from one to three and a quarter years after operation. At the Berlin clinic, of forty-six cases reported by Hofmeier,<sup>35</sup> twenty-one were free from the disease one year after operation.

Schauta<sup>40</sup> strongly advises early and radical operative treatment, claiming seventy per cent. free from recurrence one year after total extirpation as compared with fifty after the partial opera-

tion. These results are better than those obtained after extirpation of cancer in almost any other portion of the body, and appeal strongly in favor of the radical method and doubtless will be much improved when we learn to recognize the disease in its earliest stages and insist upon early operation.

The prognosis, according to Fritsch, is much better with a smooth, transverse cicatrix than with a hard, irregular one. Rapidly recurring cancer will appear in the cicatrix, while later it will more probably affect the ligaments.

Verneuil,<sup>34</sup> with Williams and Goodell, favors the method advocated by Baker of high amputation when the disease is apparently limited to the cervix, but Le Fort,<sup>34</sup> in favoring vaginal hysterectomy in all cases, calls attention to the fact that, though the immediate risk of partial hysterectomy is less, clinical experience proves that we cannot be certain of the exact limitation of the disease to the cervix and, as the cancer returns with greater virulence when not all removed, it is wiser to extirpate the entire uterus. Schauta<sup>49</sup> holds the same views, saying that with the incipient degeneration of the cervix, the cancer extends rapidly upward and that though only a few isolated nodules may be found at the vaginal portion, some may already have independently formed at the fundus. Macroscopically and clinically the diagnosis of the boundary of the cancer is impossible and for this reason a radical operation is always indicated.

Personally we believe vaginal hysterectomy to be a beneficent operation and preferable in every case to any other method of procedure, provided that the cancer has not extended beyond the uterus, *i.e.*, that the broad ligaments are not infiltrated, that the uterus remains freely movable, and that the vagina is not affected. In the absence of these conditions, we should employ palliative treatment. We think the operation but rarely justifiable in any less grave condition than the presence of cancer as above described.

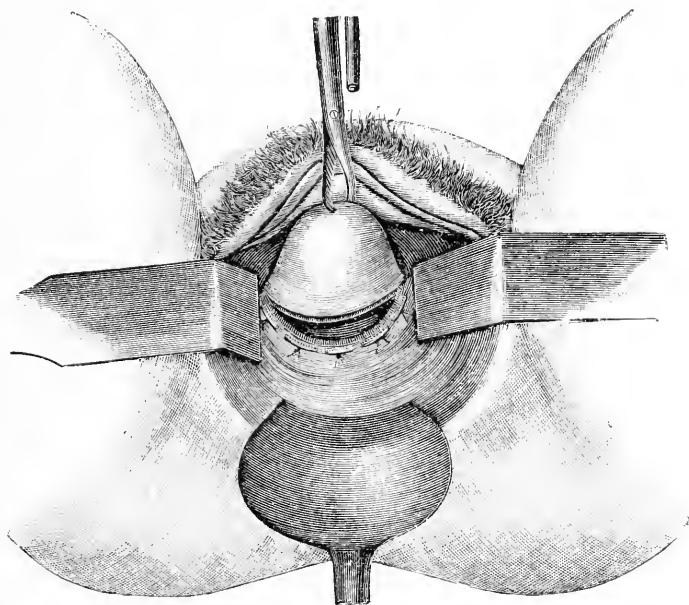
*Method of Operating.*—The method which we prefer, and which has now been accepted by the large majority of operators, is a removal *in situ* similar to that of Fritsch, Martin, and Leopold, though we believe that the clamp operation of Richelot will in time become that of election.

The patient is placed in the lithotomy position with wrists and ankles bound together, the vulva being shaved and vulva and

vagina carefully cleaned by a 1: 2000 bichloride solution; retractors are introduced and the cervix exposed to view. If the growth be very large or breaking down, the curette should be freely employed and the vagina again cleansed. The uterus is now drawn well down by several strong volcillum forceps hooked into the cervix.

A strong silk ligature is passed from each lateral fornix vaginae deeply around the base of each broad ligament, using for this purpose a strong jointed aneurism needle. These two ligatures, when drawn down and tightened, constrict the uterine arteries, which pass in through the base of the broad ligaments, and remove the danger from hæmorrhage during the subsequent steps of the operation. Next the posterior vaginal fornix is opened by a transverse incision made with blunt-pointed scissors, the opening being made wide enough to admit two fingers, and the peritoneum is stitched to the posterior vaginal wall so as to control any hæmorrhage and prevent the peritoneum being pushed up by subsequent steps. A finger is now passed into the posterior opening, around the uterus and into the anterior cul-de-sac, pressing it forward as a guide to cut down upon. The peritoneum being opened on that side, is stitched to the anterior vaginal wall. A finger is carried in the same way around the other side of the uterus and the opening extended well across the anterior fornix and sutured as before. The aneurism needle is again brought into use and ligatures are passed from within outward through successive portions of broad ligament, each ligature as it is passed being tied and the portion of tissue which it constricts divided by the scissors, cutting, of course, between it and the uterus. This process is continued until nothing remains to be divided, usually entirely finishing one side before beginning the other. Should it be thought best to remove the appendages, the uterus being well drawn down as the ligatures are tied, the ovaries and tubes will come into view so that the last and highest ligatures can be passed to their outer side around the remaining tissue of the broad ligaments, which being constricted and divided, the uterus and appendages come away together. To prevent retraction and difficulty in reaching the bleeding point in case of secondary hæmorrhage, the stump of each broad ligament is now sewed to its corresponding vaginal wall. The opening left in the vaginal vault is small and is not sutured. The ends of the ligatures on either side are bunched together and the ends cut off at

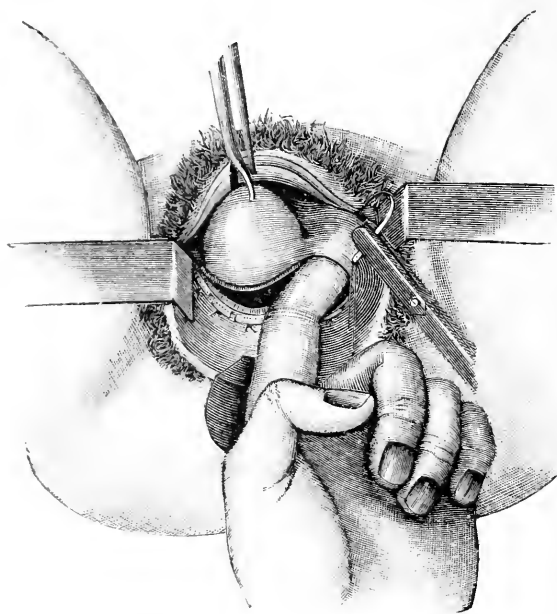
the level of the vulvar orifice. Iodoform gauze is *lightly* packed into the vagina and an antiseptic dressing placed over the vulva. The bowels should be moved on the fifth day; the urine has usually to be drawn by catheter every six hours for some days. The vaginal packing is changed on about the fifth day. The ligatures usually come away between the fifteenth and twenty-fifth days. Vaginal douching is liable to disturb forming adhesions and to carry foreign matter into the peritoneal cavity and, therefore, should be avoided until the wound has entirely closed. The use of a sponge, passed into the pelvic cavity through the opening in the anterior fornix to absorb any fluid which may enter, and to keep omentum and intestine out of the way, is entirely optional, some operators using it and others not with equally good results. In the annexed figures the steps of the operation, as performed by Martin, are shown.



VAGINAL HYSTERECTOMY.—OPENING INTO DOUGLAS' CUL-DE-SAC. SUTURES THROUGH VAGINAL WALL.—(*Annals of Gynecology*.)

Richelot, after opening the anterior and posterior fornices, uses no ligatures, but compresses the broad ligaments with strong clamps, which are left in place for from thirty-six to forty-eight hours. This method is simple, provides efficient hemostasis, and shortens materially the time required for the operation, thirty minutes being the average in the cases reported.

Muller,<sup>20</sup> Landau,<sup>26</sup> and Championnière<sup>55</sup> speak most favorably of the procedure. Greig Smith,<sup>21</sup> who operated successfully by this method on a case where, in addition to the cancer, the uterus contained twins of two months, has devised a special forceps for clamping the ligaments. These forceps consist of two blades which, locking over the top of the ligaments, are tightened by a screw at the end of the handle, and which are grooved along their edge to carry a small obliquely placed knife which, when the clamps have been placed and tightened, is pushed up the grooves,



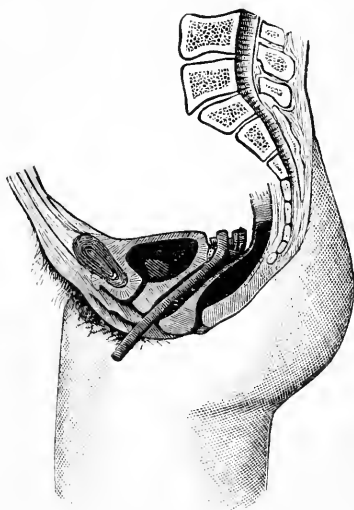
VAGINAL HYSTERECTOMY.—SEWING THE FLOOR OF THE PELVIS.—(*Annals of Gynecology.*)

severing the ligaments from the uterus. In using forcipressure in hysterectomy, care must be taken that the instrument is strong and furnished with secure fastening. The forefinger of one hand is to be hooked over the superior margin of the broad ligament to see that the forceps are properly adjusted and that no stray folds of omentum or intestine are included in its bite. Where the working space is very narrow and the uterus large, it may be impossible to include the entire ligament in the grip of the forceps; here we may first clamp and divide the lower portion and then apply a second forceps passed up through the divided lower segment, or we

can first ligate and divide the lower portion and then clamp the upper. The forceps should remain on the ligaments thirty-six or forty-eight hours.

A caution to be observed in opening the anterior and posterior fornices, is to keep close to the uterus; behind to avoid the rectum and in front the bladder and ureters. The bladder, if opened, must be carefully sutured.

The ureters run not more than a third of an inch from the antero-lateral margin of the cervix. They may sometimes be distinguished by the touch and by the pulsation of their accompanying branch of the uterine artery, but the only sure way of avoiding them is to keep close to the cervix. Worrall<sup>10</sup> reports a case where the patient died on the eighth day, the right ureter having been included in the clamp. Schmidt<sup>5</sup> reports an instance where an inch of the right ureter was cut away with the uterus; he at once removed the corresponding kidney through a lumbar incision and the patient recovered. He advocates this course rather than that of sewing the proximal end of the ureter to the vaginal wall, since inflammation and sloughing is then likely to result from the dribbling of the urine in the vagina and to necessitate a later nephrectomy, as it had done in a previous case where the same accident had happened and where the patient died six days after the second operation.



VAGINAL HYSTERECTOMY.—DRAINAGE AFTER TOTAL EXTIRPATION.—(*Annals of Gynecology.*)

#### PERITONEUM AND PELVIC CELLULAR TISSUE.

*Peritonitis.*—Several cases of tubercular peritonitis have been reported as cured by simple explorative laparotomy. We must, however, agree with Senn<sup>11</sup> in doubting the correctness of the diagnosis in certain of these cases, some of them being probably localized, non-specific, simple peritonitis from which the patients would have recovered, without incision, by simple rest. We are, however, strongly in favor of treating localized intra-peritoneal

tuberculosis by surgical means, removing if possible the primary focus and endeavoring to sterilize remaining deposits by the application of appropriate germicidal agents. In a case of undoubted tubercular peritonitis where an explorative laparotomy was done by Mundé<sup>4</sup> the patient improved greatly at first, only to succumb a few months later from an extension of the disease to the lung tissue. Van de Warker<sup>4</sup> reports a similar case, where one year after operation the tubercular process was still apparently arrested. The chances of permanent cure, however, appear to be so very slight that any prognosis of ultimate recovery should be most guarded.

In acute peritonitis, the now generally accepted treatment is one of "elimination rather than rest" (Taylor<sup>56</sup>), opiates or morphine being avoided, the bowels being kept freely open by some mild cathartic. That which has given us the best general results is magnesia sulphate, given in drachm doses every hour in hot peppermint water until the desired result is obtained. In other respects the treatment has not changed.

#### PARAMETRITIS.

*Etiology and Natural History.*—Reviewing the affection from a clinical point of view, Hardon<sup>57</sup> describes three stages in the progress of an attack of acute pelvic cellulitis, viz., the stage of serous infiltration, the stage of solidification, and the stage of suppuration. Under favorable circumstances a stage of absorption takes the place of the stage of suppuration, and the patient is spared the suffering and danger involved in the formation of an abscess. The stage of serous infiltration is not usually longer than forty-eight hours, its most prominent physical feature being that peculiar boggy feeling so readily recognized by the educated finger as characteristic of edema. This infiltration of serum is a consequence of arterial congestion which the transudation through the walls of the blood-vessels relieves, and after its occurrence the general symptoms become much less marked. The serum, infiltrated within the meshes of the cellular tissue, solidifies, and, converted into a "plastic exudation," can only be gotten rid of by the tedious process of absorption or the dangerous one of suppuration. No law has yet been discovered which governs the extension of the inflammatory process. Freund<sup>58</sup> states that while the primary seat



of the inflammation is in the tissues around the cervix or vagina, or in the peripheral connective tissue, its extension is influenced by the location of the injury and the vicinity of cicatricial bands. Simple abscess formation is nearly always limited to the region of the true pelvis; when it passes beyond, it is nearly always because of antecedent inflammatory conditions, tuberculosis, or pelvic caries. The disease may be protracted by further injuries to the inflamed or partly healed tissues or by additional septic infection. As a result of the contraction of the exudation, various sequelæ may ensue (Freund<sup>56</sup>), compression of the ureter, adhesion of the ureters to the cervix uteri, displacement and fixation of various parts of the intestinal canal, displacements of the uterus from the acquired fixation of the cervix, and, more remotely, neuralgias, chronic inflammations of the uterus, bladder, and rectum, disturbances of the pelvic blood and lymph circulations, and peritoneal adhesions. If the inflammation extend beyond the true pelvis, crural phlebitis may occur, Freund stating that its first stage is lymph stasis, and the second, venous stasis from the pressure on the crural veins.

The malignant acute septic phlegmonous parametritis, caused by the entrance of septic poison into the veins, which appears as pyæmic puerperal fever, or malignant internal puerperal erysipelas, has an especial tendency to extend to the peritoneum.

Hardon,<sup>57</sup> in discussing *chronic parametritis*, calls attention to an important point in differential diagnosis, stating that he has often met with cases which, presenting hardness and tenderness of the vaginal roof without a history of previous acute cellulitis, bore with impunity any amount of operative interference. These cases included a large number of those which had their origin in injuries received in labor, and particularly cervical lacerations of long standing. Having the same objective symptoms as ordinary cases of chronic cellulitis, they differed in the important fact that the uterus was *easily movable* and that the symptoms disappeared with great rapidity when the uterus was kept elevated to its normal height in the pelvis. Emmet and Mundé have called attention to similar conditions. Hardon explains the matter by saying that it is not a cellulitis at all, but an engorgement of the large and numerous venous sinuses of the broad ligaments caused by the traction of the sunken uterus,—a conclusion anatomically probable

and sustained by the results of Coc's<sup>17</sup> examinations of a large number of subjects who, during life, had presented the hard and tender masses at the side of the cervix ordinarily accepted as evidence of the presence of chronic cellulitis. He says: "In by far the greater number of cases where a well-marked laceration of the cervix was present, there was absolutely no induration whatever in the broad ligaments." Emmet<sup>50</sup> admits a similar explanation, except that he claims that cellulitis has always previously existed and that instead of being tolerant of interference, "the condition was one easily roused to active inflammation, as a phlebitis, from septic poisoning consequent upon any surgical interference or injury."

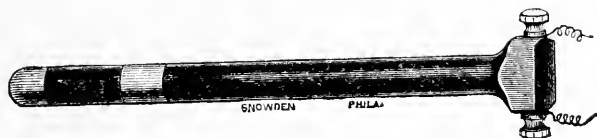
*Treatment.*—Hardon<sup>55</sup> endeavors to abort the disease by getting rid of the effused serum before it becomes solid, and reports most excellent results from aspiration, used in addition to the prolonged hot douche of Emmet. He claims that the procedure when *aseptically done*, is not hazardous. His method is to introduce the aspirator needle into the infiltrated cellular tissue and to maintain a constant suction until the serum ceases to flow. The punctures being repeated at various points, the distension is gradually diminished and the tissues reduced to a more natural condition. The pain and febrile action then subside and convalescence is rapid. The punctures may safely be made to the depth of a half an inch, as the peritoneum is pushed away from the vaginal walls by the exudation. The pulsation of any of the large arterial branches of the part may usually be detected by moderately firm pressure of the finger and the danger of injuring them be avoided. Electricity is used in the acute stage by Apostoli (see below).

Should the process go on to suppuration, the treatment by incision and drainage of the resulting abscess (as advocated by Mundé in 1880) is that now generally accepted, the opening being made through the vagina or abdomen. Aitkin,<sup>13</sup> Alloway,<sup>60</sup> Burton,<sup>61</sup> Chapman,<sup>38</sup> Crowe,<sup>5</sup> Cushing,<sup>38</sup> Eastman,<sup>28</sup> Lawrayson,<sup>62</sup> Sinclair,<sup>63</sup> and Terrillon<sup>64</sup> have reported cases treated by this method, all of which eventually recovered. Nourishing diet, iron and quinine, with stimulants if necessary, are, of course, always indicated.

Renewed attention is called by Jackson,<sup>65</sup> Engelmann,<sup>4</sup>

Etheridge<sup>65</sup> and others to the value of systematic tamponade of the vagina in the treatment of the chronic forms of cellulitis. The best tampon material is "antiseptic wool." This is finely carded, soft, very elastic, freed from all foreign material, and sufficiently absorbent to take up the necessary amount of any medicament needed. It retains its elasticity and remains without odor much longer than cotton, so that it can in many cases be retained with benefit and comfort from four to six days. We have found its use followed by the most gratifying results in cases where cotton had only caused increased discomfort.

Apostoli<sup>5</sup> claims that electricity can be employed with benefit in all the stages of a cellulitis and that it offers a method of relief and cure safer and more speedy than any other. These

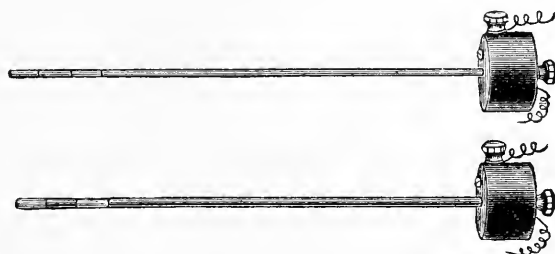


BIPOLAR VAGINAL ELECTRODE.



BIPOLAR CONCENTRIC DISK ELECTRODE.—(*British Medical Journal*.)

statements are corroborated by Hulbert<sup>28</sup> and others. Apostoli divides the affection therapeutically into three forms: acute, sub-acute, and chronic. At the outset of an acute attack of para-



BIPOLAR SOUNDS WITH INSULATED SHAFT.—(*British Medical Journal*.)

metritis, he employs the electricity to calm the pain and abridge the first stage of inflammation, using a faradic current of *high tension* but *small quantity*, with a large bipolar vaginal electrode placed against the inflamed part. There should be from one to

two applications each day of from five to twenty-five minutes, each of which "should not terminate before the patient spontaneously declares that she suffers less." These applications, made with the greatest gentleness, the current not being strong enough to cause pain, should be preceded and followed by an antiseptic vaginal douche, and all instruments should be scrupulously disinfected.

As soon as the sound can be introduced into the uterus without much pain or danger, he considers that the subacute stage is begun and, using the same faradic current of high tension, he begins to make daily intra-uterine applications with a bipolar electrode, gradually increasing the intensity to the limit of personal tolerance, and limiting the length of applications as before. This is continued until there is decided amendment, when he begins to use the galvanic current with the *positive* pole in the uterus, beginning with small, short doses and increasing gradually both in strength and time, to the limit of personal endurance. One or two applications a week are to be made, with rest in bed afterward, and the same careful antiseptic precautions are employed as in the first stage. The operator is cautioned that "he is handling an agent that, while capable of great service, may, when indiscreetly used, do grievous mischief."

In the chronic stage, there is no reason why the operator should not act boldly and he is advised to use negative galvanopuncture with as strong a current as the patient can bear, or from 50 to 250 milliamperes, the applications averaging five minutes, being made by preference midway between the menstrual periods, and varying in number according to the gravity of the case from one to ten or more. Anaesthesia may be employed or not according to the sensibility of the patient. The needle may be of steel, as metals are not attacked at the negative pole, and must be insulated nearly to its tip. The puncture should not be deeper than a half inch, should be made at a prominent part of the exudation, but as near to the uterus and as far posteriorly as possible, every spot being avoided where the finger can recognize arterial pulsation. The needle is introduced without a speculum, guided by the point of the finger. The eschar from the puncture will separate from the fourth to the eighth day, leaving a sinus extending into the substance of the exudation. These sinuses act as drains and remain open from fifteen to thirty days. Rigorous antiseptic pre-

cautions are necessary throughout the treatment and the vagina should be plugged with iodoform gauze every other day from the time of puncture until all sinuses are healed. Where there is abscess formation, the pus is evacuated through a sinus formed by this same negative galvano-puncture.

*Chronic Atrophic Parametritis.* — Freund<sup>58</sup> discusses this condition minutely, finding an analogy of the process in the granular atrophy or cirrhosis of the larger glandular organs. The disease originates in the "aponeurotic thickening" of the pelvic connective tissue and is not to be considered as a sequel of acute cellulitis, but as a distinct affection in two forms, a circumscribed and a diffuse.

The circumscribed variety may follow ulceration of the bladder (paracystitis), dysenteric and follicular ulceration of the rectum (paraproctitis), and ulcers of the cervix (chronic atrophic parametritis); it may be followed by displacement of the uterus, especially laterally; adhesions of the uterus to the cervix, thickening of the pelvic peritoneum, dislocation of the ovaries, thickening of the broad ligament, partial displacement of the bladder, chronic catarrh and induration of the cervix uteri, hyperæmia about the rectum, and hæmorrhoids, \*phlebitis and thrombosis. The differential diagnosis between this form and the chronic pelvic peritonitis of Douglas' cul-de-sac may be difficult. Complete healing may follow a removal of the cause, especially if a normal pregnancy intervene.

The diffused form arises from the pelvic fasciæ which envelop and support the uterus in its whole extent, and especially from the connective tissue which forms the base of the broad ligament, from the tissues between Douglas' cul-de-sac and the rectum, an especial predilection being shown for the left side of the pelvis. In extreme cases the floor of the pelvis may become atrophied, and the degeneration may further involve the subserous tissues of the anterior and posterior abdominal walls and the connective tissue of the mesentery of the colon. Microscopically we find cicatricial hyperplasia of the pelvic cellular tissue, with periphlebitis and perineuritis of the larger ganglia of the pelvis. The ganglion of Frankenhauser is decreased in size, and the intergangliar connective tissue is hyperplastic; the ganglion cells are shrunk and infiltrated with brown pigment, the remains of the nucleus being difficult to dis-

cover. In the latter stages of the disease, the areolar hyperplasia reaches a much higher degree.

The most important sequelæ of diffuse atrophic parametritis are: venous hyperæmia of the pelvic organs; cystitis and rectal catarrh; atrophy of the muscular tissues of these organs; an uneven, granular condition of the surface of the uterus from scars and dilated veins, with clouding of the serous covering of the uterus; hyperplasia of the connective tissue in the uterine walls; atrophy of the uterine mucous membrane and of the round ligament; and widening of the inguinal and femoral canals; twisting and stenosis of the Fallopian tubes; hyperplasia of the connective tissue of their walls and atrophy of the mucous membrane; cicatricial atrophy of the ovaries; atrophy of the vaginal walls and narrowing of the vaginal cavity; atrophy of the external genitals, and dilatation of the veins of the anus, urethra and neck of the bladder; and finally, in extreme cases, relaxation of the abdominal walls, atrophy and dilatation of the colon, and prolapsus and distortion of the sigmoid flexure of the colon.

The etiological conditions which lead to the diffuse form are sexual excitement, masturbation, too frequent coitus; also diarrhœa, profuse sweats, catarrhal discharges, hæmorrhages, faulty nutrition, mental and physical strain, and finally, hyperplasia of the genitals and vascular system; and even gonorrhœa and syphilis are mentioned as occasional causes. The local symptoms correspond with the seat of the anatomical changes. The patient is afflicted with pains which radiate from the atrophied places along the nates, the hips, the inner surface of the thigh to the abdomen, chest, shoulder and neck; sacro- and coccygodynia, pains in the pelvis, ischuria, tenesmus, dysmenorrhœa, etc. Both the menstrual flow and the catarrhal discharges are at first increased, and later diminished and often completely abolished. Masturbation is often practiced, and nocturnal pollutions are present with an abundant thin discharge. If conception takes place, pregnancy may normally run its course, and parturition be followed by an improvement, owing to the loosening of the tissues. In some cases, however, the puerperal condition is accompanied by increased atrophy. In the later stages of the disease, pregnancy is impossible.

Diffuse chronic parametritis is further accompanied by constitutional disturbances of all kinds. It leads to sympathetic reflex

neuroses of both cerebral and spinal origin, and to vaso-motor and trophic disturbances of various kinds, and also to the most extreme type of hysteria, the cerebral form of which the author describes in the classical language of Forster.

These reflex neuroses, however, must not be held as conclusive of the existence of an atrophic parametritis. They merely show that the nervous system of the pelvis suffers from an atrophic process, and may appear in puerperal atrophy if the ganglia be involved. On the contrary, ovarian excitement following peri-*oöphoritis* furnishes a peculiar and distinctive picture. As to prognosis in diffuse atrophic parametritis, an arrest of the disease may be expected, but not a complete cure.

The surgical treatment of the disease is unsatisfactory. Castration and clitoridectomy are useless. Benefit may be derived from stretching the dense cicatricial tissue under narcosis and securing the vagina in the most favorable position after dilatation. Palliative injections of atropine are of service; immobilization of the uterus by tampons, regulation of the bowels, and clysters of cod-liver oil, in sympathetic neuroses; bismuth subnitrate in spinal, nitrate of silver in cerebral, acetate of zinc in vaso-motor disturbances, preparations of ammonium, castoreum, and valerian, in disturbances of general nutrition.

Simple atrophy of the pelvic connective tissue may originate in a patient who has passed through parturition, lactation, and the puerperal diseases in rapid succession, and goes hand in hand with atrophy of the uterus. Hysterical symptoms may appear, but are not so severe as in atrophic parametritis.

*Neoplasms of the Connective Tissue of the Pelvis.*—Freund<sup>58</sup> describes three cases of intra-ligamentous myofibromata, two of which were successfully operated upon. He further mentions the increase of fatty tissue in the pelvis in general obesity and after the subsidence of acute pelvic cellulitis. The pelvic tissues may be compressed or displaced by neoplasms of other organs, by parasites, burrowing abscesses, subserous myofibromata, malignant growths, intra-ligamentous cysts, and tubal pregnancy.

*Pelvic Echinococci.*—Freund<sup>58</sup> reports nineteen cases of *echinococcus* of the pelvic connective tissue observed by himself and three cases seen by Schroeder. He describes the entrance of the

parasite into the pelvic organs, either by burrowing or migration from organs above, or their primary origin in the pelvic bones or the connective tissue around the rectum. That they first appear in the ovaries is doubtful. They may pass into the connective tissue on the sides of the pelvis, to the uterus and urinary bladder, and downward to the perineum. The pelvis may be entered through the ischiatic foramen, through the intervals between the muscles and blood-vessels under Poupart's ligament, and the parasite may penetrate under the peritoneum of the anterior abdominal walls. It may also remain under the peritoneal covering of the various organs.

The invasion of *echinococcus* into the pelvic connective tissue causes a chronic pelvic cellulitis, pelvic peritonitis, displacement and distortion of the pelvic organs, chronic inflammatory hypertrophy and venous stasis, ischemia and ulceration of the pelvic organs, and occasionally it may penetrate the neighboring hollow organs, but not the peritoneum on account of chronic inflammatory thickening of the pelvic connective tissue. Finally the *echinococcus* may die and putrefy.

Anatomically, in pelvic *echinococci*, the parasite consists of a maternal cyst with daughter cells, and is not present in the ordinary alveolar form. The parasite may remain quiescent for a long time, or it may take on a rapid growth and produce disturbance of function of the pelvic organs, with suppuration, fever and general marasmus. Evacuation may occur by the rectum and bladder, very rarely by the uterus or vagina. In reference to diagnosis, the position of the subperitoneal tumor, between the uterus and the rectum, or more laterally, in the posterior region of the pelvis, close to the pelvic walls, without connection with the uterus or its appendages, is important. The feeling is described as that of a tense, elastic bladder, with homogeneous walls.

The diagnosis may be confirmed by examination of the contents of the tumor by aspiration, yet the puncture may lead to suppuration within the sac.

The parasite is best removed by freely opening the tumor and evacuating its contents, shelling out the mother cyst, either by laparotomy or through the vault of the vagina. If it be impossible to remove the mother cyst, the tumor should be sewed to the abdominal wall and treated by either temporary packing or by drainage.



*Pelvic Hæmatocele.*—Powell<sup>66</sup> records an interesting case where, one hour after a normal labor, a large extra-peritoneal hæmatoma developed, filling the pelvis and reaching down between the rectum and vagina. On the third day, there was a subsidence of the symptoms, the woman expressed herself as feeling comfortable, was in no pain and had lost all sense of distress. She said that very early in the morning she felt as if something had given way, and on examination it was found that the cellular tissue about the ischio-rectal fossa had parted, the blood had forced its way down beneath the perineal fascia and had extravasated between the layers of cellular tissue and fascia under the skin of the inside of the left thigh and over the buttock to the outside of the hip, and no doubt also between the layers of gluteal muscles, as the left buttock felt firm and resisting in the region of the large ecchymosis. On vaginal examination, there could still be felt a soft boggy swelling, quite unlike the former firm, elastic, tense one. No untoward symptoms occurred to mar the convalescence, and the patient was out of bed in a fortnight. The remains of the tumor were gradually and rapidly absorbed, and two months later there was no trace whatever of her former tumor.

Jeannel<sup>67</sup> records a case of retro-uterine hæmatocele, where he performed an extra-peritoneal laparotomy with abdominal and vaginal drainage, the incision, and pushing up of the peritoneum being similar to that of laparo-clytrotomy. Recovery was complete. Segond<sup>27</sup> reports a somewhat similar case, also successful. Gusserow<sup>29</sup> records eight cases, all successfully treated by vaginal incision and drainage.

While absolute rest in bed is all that is required in the majority of cases of extra-peritoneal hæmatocele of moderate size, vaginal incision and drainage, practised by Mundé<sup>68</sup> in 1885, is now advocated by nearly all in those cases where the patient cannot afford to rest sufficiently long to allow complete absorption, where great local disturbance is set up, where absorption has not taken place under the rest treatment, and where the blood tumor is of large size. The operation should not be done sooner than a couple of weeks after the primary hæmorrhage, so that we avoid the danger of secondary bleeding. The vagina having been disinfected, the puncture is made in the most prominent point of the swelling, sagittal, as near the median line as possible, and with a

small lance-pointed bistoury. Pulsating vessels should be avoided. The incision may be dilated to a sufficient size by a steel-branched uterine dilator, blood-clots broken up by the finger, and the cavity irrigated with a disinfectant solution. Should there be any hæmorrhage from the sac, it may be packed with iodoform gauze, otherwise a drainage tube is inserted and the vagina lightly tamponed with iodoform gauze. The after-treatment consists in daily anti-septic irrigation.

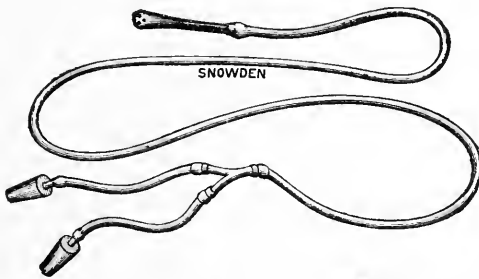
#### MISCELLANEOUS.

*Ureters.*—Kelly<sup>4</sup> calls attention to the ease with which the ureters may be palpated and catheterized. These organs, after some practice, may be readily outlined through the anterior vaginal wall and traced back posteriorly, when it becomes a simple matter to insert the catheter. The advantages of this procedure from a diagnostic standpoint are too obvious to call for reference. Kelly's experience is in complete accord with that of Pawlick and Simon and the statements of these observers should lead others toward practically testing the method.

*Massage.*—To judge from accumulating evidence, massage should be utilized more frequently in the treatment of certain affections of the female genital organs than is at all customary. Amongst others, Kesch<sup>26</sup> and Schauta<sup>69</sup> have found it a valuable adjuvant to other means in the following affections: chronic and subacute inflammations of the cellular tissue and the resulting dislocation of the uterus and adnexa; retro-uterine hematocoele; chronic metritis (areolar hyperplasia); relaxation of the uterine ligaments and prolapse of the uterus. Massage acts by causing absorption, by equalizing the pelvic circulation, and by restoring tone to the relaxed tissues. Any acute process is the general contra-indication to the method. It should be resorted to, preferably, through combined manipulation, either vagino-abdominal or recto-abdominal. When the internal finger is vaginal, it should be kept quiet, for obvious reasons, only steadying the organs which are pressed upon by the external hand. The séances are preferably repeated twice daily, the manipulation lasting each time for from ten to fifteen minutes. Kesch claims that the best results are obtainable through massage during menstruation, the duration of treatment being thus markedly lessened. In case of hematocoele he has resorted to massage within ten to fourteen days after the

formation of the tumor with the result of greatly expediting absorption.

*Neuroses.*—The cure of neuroses as the result of one or another, frequently rather trifling operation, is a fact which has over and again been noted. Gnauck<sup>26</sup> calls special attention to the fact that at times neurotic symptoms may follow on the performance of some gynecological operation. He instances a marked case where perineorrhaphy was followed by deep hypochondriasis. This fact is also dwelt upon by Landau<sup>26</sup>, Düvelius<sup>26</sup>, Löhlein<sup>26</sup> and others, although it is granted that it is difficult to decide in any

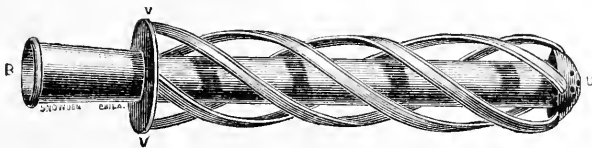


SHOEMAKER'S VAGINAL DOUCHE.—(*Medical News.*)

individual case whether the neurosis is the direct sequence of the operation or only the predominance to a greater degree of neurotic symptoms antedating the operation and so trifling as to have escaped notice.

*Instruments.*—Of the instruments which have latterly been devised for the purpose of vaginal irrigation or exploration, the following are most worthy of note.

Shoemaker<sup>39</sup> describes a simple hot-water vaginal douche, by means of which the patient may properly irrigate herself. It con-



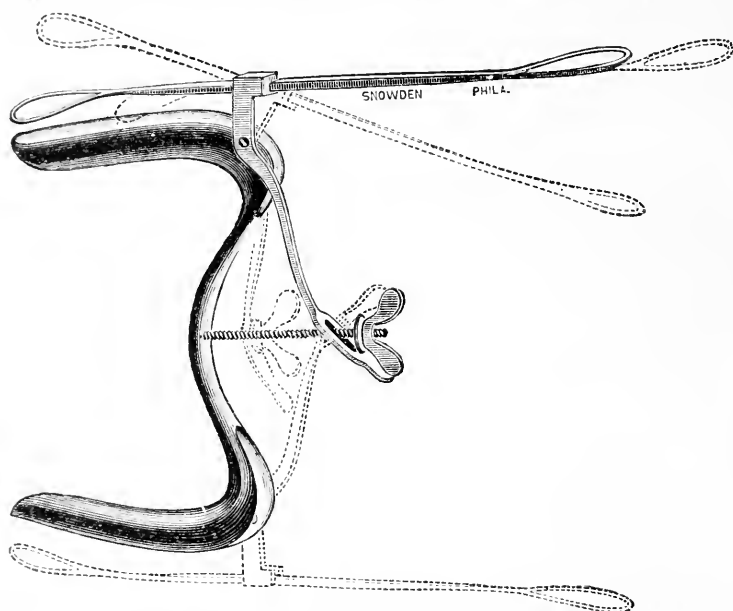
MENIERE'S IRRIGATING CANULA.—(*Gaz. de Gynecologic.*)

sists simply of rubber tubing in the form of a letter Y, armed at one end with an ordinary syringe-nozzle, and at the ends of the branches with rubber corks which fit respectively into the hot and cold-water faucets of the ordinary bath-tub. On properly opening both faucets, water of any desired temperature may be obtained.

Ménière<sup>27</sup> has devised a convenient double irrigating canula,

the chief advantage of which is that the vaginal walls are kept apart so that the injected fluid may thoroughly permeate the rugosities.

While on the subject of vaginal injections, we would refer to Foster's<sup>12</sup> advocacy of their administration in Sims' posture. It is evident that when a vaginal injection is administered with the patient in the dorsal position, the amount of water contained in the vagina at any one time is much less than that which will fill the canal when it is distended by atmospheric pressure, as is the case when the patient lies in Sims' position; further, the gravitation of the abdominal and pelvic contents toward the diaphragm brings the vaginal vault and, consequently, the water contained in the



DENCH'S MODIFICATION OF SIMS' SPECULUM.—(*New York Medical Journal*.)

vagina into closer relation with the diseased parts than is likely to be the case when the dorsal position is made use of.

Sims' speculum has during the past year been modified by Dench<sup>17</sup> so as to enable one person to manipulate it. It consists of a light Sims' to the middle of the back of which is fastened a bar, on which is cut a screw-thread. On the upper surface of each blade, near its junction with the back, is a French pivot, by means of which a lever can be attached to either blade. In the short arm of the lever is cut a groove of the size and shape of a cross-section

of the depressor handle. The long arm of the lever is perforated and fits over the bar attached to the back of the speculum.

In the accompanying figure the instrument is shown with the depressor in the groove; the dotted lines indicate the position assumed when the instrument is in position. The following are the special advantages claimed for the instrument: the depressor is introduced and removed as a separate instrument, not becoming a part of the speculum until the cervix is thoroughly exposed, this being especially advantageous when the parts are small or sensitive. There are two different sizes of blades as in the original Sims', and when the lever is removed it becomes an ordinary Sims'.

An excellent self-retaining Sims' has been devised by Cleveland.<sup>4</sup> The objections common to all the specula of this nature as yet offered to us are their complexity, the time requisite for their adaptation, and the fact that they do not retract the perineum slightly upward, as is essential in order to obtain good exposure. Cleveland's modification is free from these disadvantages, and in its use approximates very nearly to the original instrument held by a nurse. It consists of two Sims' blades, each with a flange, and separated by an interval of one inch and three-quarters. These blades are at a slight angle to one another, so that when the instrument is in position, the perineum is retracted a little upward, the point of the vaginal blade being tilted a trifle downward. At the point of each blade is a fenestra and at the bend of the instrument, where the two blades come together, is a narrow band. The instrument is completed by a belt and strap. To apply the instrument, the belt is first buckled loosely by the patient about her waist and outside of her clothing, with the attached strap behind, and the hook, which it carries, outward. She is then placed in Sims' position. The operator selects the blade he desires to use, and holding the instrument with the right hand, with the left he passes the leather strap through the fenestra at the point of the other blade and then under the metal band, leaving the strap quite loose between them. Then holding the speculum, still with the right hand, with the index finger extended along the concavity of the blade, it is introduced, care being taken to pass it back of the cervix. The leather strap is then drawn as tightly as is necessary to sufficiently retract the perineum and is then fastened on the hook. This instrument is

said by those who have tested it to be very efficient, although it cannot any more than the other self-retaining specula take the place of a well-trained nurse.

## REFERENCES.

1. Boston Med. and Surg. Jour. 2. Pacific Med. and Surg. Jour. 3. Berlin Klin. Woch. 4. Am. Jour. Obst. 5. Brit. Med. Jour. 6. Pittsburgh Med. Rev. 7. Am. Med. Digest. 8. Med. Bulletin. 9. Trans. Texas State Med. Assoc. 10. London Med. Rec. 11. Jour. Am. Med. Assoc. 12. Jour. de Méd. de Paris. 13. Med. Press. 14. Lyon Méd. 15. Obst. Gaz. 16. Nouv. Arch. de Gyn. et d'Obst. 17. N. Y. Med. Jour. 18. Deut. Med. Zeit. 19. Provincial Med. Jour. 20. Revue Méd. Chir. des Mal. de Femmes. 21. Lancet. 22. Sur un nouveau traitement de la métrite chronique, etc., Paris: Octave Doin. 23. Med. Record. 24. Med. Register. 25. Glasgow Med. Jour. 26. Cent. für Gyn. 27. Gaz. de Gyn. 28. Weekly Med. Rev. 29. Arch. für Gyn. 30. An. de Gyn. 31. Maryland Med. Jour. 32. Deut. Med. Woch. 33. Annals of Gyn. 34. La Semaine Méd. 35. Zeit. f. Geburt. u. Gyn. 36. Brit. Gyn. Jour. 37. Trans. Am. Gyn. Soc. 38. Edinburgh Med. Jour. 39. Med. News. 40. Chicago Med. Journal. 41. l'Union Méd. 42. Gaillard's Med. Jour. 43. Gaz. des Hôpitaux. 44. Canada Med. Rec. 45. Württemberg Med. Correspondence. 46. Wien. Med. Woch. 47. Austral. Med. Gaz. 48. Rep. of Fr. Ecklund, Corr. Ed. 49. Wien. Med. Presse. 50. Bull. d. l. Soc. Anat. 51. Practice. 52. Med. Press and Circular. 53. Am. Jour. Med. Sci. 54. Cent. für Chir. 55. Rep. of Championnière, Corr. Ed. 56. Birmingham Med. Rev. 57. Atlanta Med. and Surg. Jour. 58. Med. Press West. N.Y. 59. Gynecological Trans. 60. Rep. of A. A. Brown, Corr. Ed. 61. Liverpool Med. Chir. Jour. 62. New Orleans M. and S. Jour. 63. Med. Chronicle. 64. Le Praticien. 65. Med. Standard. 66. Canadian Pract. 67. Trans. Paris Surg. Soc. 68. N.Y. Mediz. Presse. 69. Präger Med. Woch.

[Undated references apply to journals published in 1887, and original articles can be found by consulting the indexes of the respective publications.]

# MENSTRUATION AND ITS DISORDERS.

BY E. C. DUDLEY, M.D.,

ASSISTED BY

JUNIUS HOAG, M.D.,

CHICAGO.

---

## GENERAL CONSIDERATIONS.

ALTHOUGH the theory of menstruation as developed by Costé, Gendrin, Negrier and others, in the years between 1837 and 1840, remains classic, still phenomena are often observed which seem to confirm the opinions of those who maintain the idea of the independence of the functions of ovulation and menstruation.

Some very important papers on this subject have been read before the British Gynecological Society, by Mr. J. Bland Sutton,<sup>1</sup> of London, and Dr. Arthur W. Johnstone,<sup>2</sup> of Danville, Kentucky.

Mr. Sutton confined his observations mainly to a study of menstruation in the quadrumana and particularly the macaques and baboons, although he also made microscopical examinations of some uteri from young women who had died during menstruation.

Both of the writers mentioned compared their observations with those of Dr. John Williams,<sup>3</sup> of London, who has brought forward original investigations in substantiation of the theory of "denudation," or the disintegration of the superficial layers of the uterine mucous membrane during the menstrual period.

Mr. Sutton believes that his examinations of the human uterus show that the amount of disintegration taking place has been greatly exaggerated and that in point of fact the process involves merely the superficial and glandular epithelium. In badly preserved specimens he found just such changes as Dr. Williams described, and he attributes them entirely to a faulty technique in their preparations for microscopic examination, the preservation of the epithelium in these specimens being a matter of very great difficulty. The investigator accordingly proposes to

define menstruation as "the periodic discharge of blood from the uterus, accompanied by the shedding of the epithelium of the body and fundus, as well as of that lining the utricular glands near their orifices." The mucous membrane of the Fallopian tubes undergoes *no alterations whatever*.

As regards the uterine mucous membrane, other important changes take place. Whereas immediately before the commencement of the menstrual flow the membrane is infiltrated with rounded cells, after its cessation a great diminution in their numbers may be demonstrated. Mr. Sutton terms the cells "the corpuscular element," and deems it probable that its increase is due to the afflux of blood to the uterus.

The conclusions drawn from the study of the human subject are these:—

1. The uterine mucous membrane is normally not shed during menstruation, but only the epithelium.
2. The sanguineous discharge is due partly to oozing from the surface denuded of epithelium, and in part to active congestion.
3. The discharge from the uterus is largely augmented by mucus secreted in increased quantity at this period from the enlarged utricular glands.

In his studies of comparative physiology, Mr. Sutton found that the females of the macaque and baboon genera menstruate in a regular and fairly frequent manner. He was able in a number of instances to obtain uteri immediately after death, thus securing perfectly fresh specimens from which to make his microscopic studies of the menstrual function.

From numerous observations, he was quite unable to obtain any evidence of disintegration of the mucous membrane, the only noticeable change taking place being a turgescence of the mucous layer. The layer of cells on the free surface was quite intact even when the uterus was filled with blood. He concludes therefore that

1. Macaque monkeys and baboons suffer a periodical loss of blood from the uterus.
2. Unlike the human female, there is no shedding of the epithelial lining of the mucous membrane of the uterus and utricular glands.
3. The amount of blood which escapes is very small in quantity.



As in the human subject, he found that badly preserved specimens exhibited the appearance described as denudation. Thus far in his researches he has been unable to satisfy himself that ovulation and menstruation are coincident; some of the ovaries examined showing no ripened ova, although active menstruation had taken place shortly before the animals were killed.

Dr. Johnstone, in a well elaborated paper entitled "The Menstrual Organ," endeavors to prove his belief that the functions of the ovary and the uterus are separate and distinct and that the endometrium is the real organ of menstruation. He regards the endometrium not as a mucous membrane in the ordinary acceptance of the term, but as belonging to the adenoid tissues and representing a type of mucous membrane farthest of all removed from the mucous structures which have for their functions simply the protection of the underlying structures, the flow of blood in menstruation therefore bearing the same relation to the endometrium that the lymph-stream sustains to the lymph-gland or the blood current to the spleen.

Dr. Johnstone refers his readers to a paper on the "Origin of the Blood Corpuscles," published in the *New York Archives of Medicine*, 1881, which discusses what is alleged to be an overlooked method of development constant in the adenoid tissues whereby the interstices of the structures are crowded with corpuscular elements. Accidentally discovering a similar appearance in the lining membrane of a uterus, he pursued the investigation and, after a great number of observations, satisfied himself that these corpuscular elements are normal in the fully developed endometrium, that they make their first appearance with the advent of puberty and disappear in old age.

In the human female the endometrium is firmly bound to the muscular tissues, whereas, in some at least of the lower animals, a rich supply of lymph sinuses is interposed. In the human being the erect posture requires a tonicity of structure in the uterus for the preservation of its shape, which could not exist were the organ supplied with the loose lymphatic network found in the lower animals. In the latter the lymph-stream empties the corpuscles into the general circulation, while in the former the streams pours into the uterine cavity and escapes from the body. The explanation suggested to account for the cessation of men-

stration after the removal of the ovaries, is that the nerves of the tubes and broad ligaments exert a trophic influence upon the function of the endometrium.

The investigator reports the examination of only two menstruating uteri, but in these he asserts that the only loss of substance was that which involved the epithelial lining of the uterine cavity. Referring to Dr. Williams' work, he charges two errors: one, that the specimens examined were derived from pathological organs in which degenerative changes had taken place; the other, that lenses of too feeble power were employed.

In another paper on the same subject<sup>4</sup> Dr. Johnstone reports a continuation of his investigations, during the progress of which he finds confirmatory evidence in substantiation of his theory. As a point of great practical value, he lays stress upon the necessity of dividing the broad ligaments as close as possible to the uterus, in order to make sure of putting a stop to menstruation. In many of Mr. Tait's operations, Dr. Johnstone has noticed one large nerve trunk in particular which lay so close to the line of incision that if the operator had not been careful to extirpate the entire tube the nerve would have remained to continue its functions. Two of Tait's cases are cited in which removal of the ovaries proving insufficient for the establishment of the menopause, the uteri themselves were subsequently divided at the level of the internal os and removed. Dr. Johnstone examined the stumps of the tubes which had been left behind in the primary operations and found that the nerve had not been removed in either instance. Accordingly, in cases where removal of the uterine appendages is an impossibility, he believes that it would be good practice to ligate both tubes at their points of origin, with a view to cut off the entire nerve supply of the endometrium.

Mr. Lawson Tait,<sup>5</sup> who is a pronounced skeptic regarding all theories which contemplate menstruation as the effect of ovulation, assigns two reasons for his unbelief: One, the fact that menstruation occurs only in the primates; the other, that ovulation begins before menstruation and does not cease with the climacteric. He also finds great satisfaction in the work of Mr. Sutton and Dr. Johnstone as affording ready explanation of several puzzling problems. First of all, he finds an adequate explanation for the occurrence of tubal pregnancy, which he believes is due to desquamative salpin-

gitis, the ovum effecting an attachment to a surface laid bare of its epithelium. Viewing clinical observations in the light of the above described studies, he reaches conclusions which may be summarized as follow:—

1. Chronic endometritis often involves sterility, which may be overcome by the use of the curette.
2. Infantile uterus involves sterility because of the absence of glandular tissue.
3. In senile women, the development of cancer is ulcerative and slow because of the small amount of glandular tissue present in the uterus, while in young women its progress is much more rapid.
4. The glandular functions of the ovary being co-extensive with the duration of life, ovarian tumors are met with at all ages. Not so as regards the development of myoma, which takes place only between the periods of puberty and the menopause.

Dr. James Oliver,<sup>6</sup> of Edinburgh, disclaims all faith in those theories of menstruation which have for their basis the supposition of the periodic shedding of the uterine mucous membrane. In their stead he supports a theory of the nerve-origin of menstruation. Vicarious organic compensation, he says, often takes place in the human subject and still oftener in the lower animals. The recurring physical changes in the uterus are the sequences of molecular disturbances arising in some centre high up in the cerebro-spinal tract. Like all other nerve centres with similar functions, this uterine centre is beyond the control of volition, but may be disordered by emotional impressions. Epilepsy causes more marked and more uniform disturbance of the uterine functions than any other functional disorder. This is the result of some unknown condition of the corpuscular elements which govern the activities of the uterus. Structural changes, however, eventually take place as the results of organic inaction over action. Ovulation may often occur independently of menstruation. There is no analogy in the whole animal kingdom to the alleged recurring death of the endometrium. The glands of the endometrium exhibit marked enlargement corresponding to the menstrual periods, but the microscope in Dr. Oliver's hands has failed to reveal any breach in the lining membrane of the uterus, except when this structure has been destroyed by the progressive growth of fibroid tumors. It is impossible that

regeneration of the endometrium can take place with the rapidity involved in the theory of the shedding of the mucous membrane. This writer's actual observations seem to have been conducted with skill, but his explanation of the real physiology of menstruation is, to say the least, couched in very vague terms.

#### AMENORRHŒA.

*Definition.*—Amenorrhœa is the absence, from pathological causes, of the normal menstrual flow. The term includes

1. *Emansio mensium*, where menstruation has never been established.

2. *Suppressio mensium*, where the periodicity of the flow has been destroyed and the discharge no longer takes place.

3. *Retentio mensium*, where the menstrual fluid is pent up within the uterus or vagina.

*Etiology.*—Although the physiology of menstruation remains an unsolved problem, it may be affirmed that normal menstruation requires for its proper performance the integrity of the genital organs and the nervous and circulatory systems. The disorder is most frequently referable to functional causes, hence the necessity of careful discrimination in ascertaining the sources of disturbance which bring about the condition.

In a system of organs where a multitude of functional activities are so delicately adjusted as in the case of the female generative system, a destruction of equilibrium may be determined by the greatest possible variety of exciting causes. In general it may be said that amenorrhœa is symptomatic of incomplete physical development, of constitutional disease, or of disease affecting the genital system. The influence of social customs and climate upon the menstrual function, although matters of every day experience, are none the less deserving of thoughtful consideration.

As the result of a very extensive series of observations regarding menstruation in women of different nationalities, Dr. Rouvier,<sup>7</sup> of Beirut finds that working women do not begin to menstruate at as early an age as women of leisure; that the duration of menstrual life is greater in hot countries than in cold ones, and that in both hot and cold climates the menstrual period of working women is of shorter duration than that of the leisure classes.

Another observation of great interest has been alluded to by

Dr. James Stirton,<sup>s</sup> to the effect that in certain barbarous tribes of South Africa, whose habits of life closely approach those of the brute creation, the women menstruate only at irregular periods and in a very scanty manner, and further, that menstruation itself is slowly inaugurated with a discharge of mucus, as in the case of what may be termed the menstruation of some of the inferior animals. In these women it is said that nothing like normal menstruation takes place until after indiscriminate intercourse has been practiced.

Dr. Stirton believes that menstruation is a product of civilization, supporting his theory by facts drawn from a study of comparative physiology. Among these he mentions the menstruation of some animals which have been long domesticated and fed on rich food, as rabbits, sows and elephants, as well as the undomesticated quadrumana. In the savages above mentioned he finds an example of a distinct reversion of physiological type. This writer refers also to the well known late appearance of menstruation among the people of Northern Europe. Complete suppression of the menses is alleged to take place very frequently among the women of Greenland, especially during the winter season, and that, too, without entailing the slightest disturbances of health. Similar conditions are said to prevail among the inhabitants of the higher mountainous regions of Switzerland and France.

In estimating the effects of strong emotions on menstruation, Dr. Stirton considers that they are rather more apt to be of an inhibitory character than otherwise. He also finds an argument for the independence of ovulation and menstruation in the very fact that strong emotion is often the exciting cause of the menstrual flow. He advances the opinion that the uterus with its appendages, constitutes a true erectile organ, analogies to other erectile organs being sought in the large uterine sinuses and in the phenomena which may be seen occasionally through the speculum, such as turgescence of the cervix, the dilatation of the os externum and the copious discharge of Nabothian mucus.

*Treatment.*—The causes of amenorrhœa being numerous and often of obscure origin, it is by no means surprising that we have such a long list of vaunted remedies and that we read so many accounts of marvelous cures; the discrepancies so apparent in the various reports of cases being clearly due to errors of observation.

The various preparations of manganese continue to receive a large share of attention on the part of the profession, and although their efficacy is denied *in toto* by excellent authorities, there seems to be no valid reason to doubt their beneficial action in properly selected cases.

The binoxide is largely taking the place of the permanganate, by reason of its being less irritating in its properties. Both preparations are administered in doses of one or two grains three or four times a day, preferably after eating or after the ingestion of a copious draught of milk or water.

Dr. W. P. Ellis,<sup>9</sup> of Livermore, Kentucky, reports favorably on the use of the permanganate of potassium, having experienced the most satisfactory results from its employment in various cases, including sudden suppression of the menses from exposure and in chlorotic cases. He does not believe in the validity of the objection that it decomposes readily, but quite the contrary, since the active agent is the manganese itself. He has found that the intolerance of the stomach to its presence, as well as other bad effects, such as great prostration, are due to the rapidity of its decomposition, especially in an empty stomach. This difficulty may be avoided in the manner already mentioned. Dr. Ellis finds the action of the binoxide of manganese and the manganate of sodium to be quite similar to that of the permanganate, and attributes it to the direct tonic and stimulant effect upon the uterus and not to a general tonic influence upon the entire system, as proved by the fact that anæmic patients are not improved by the re-establishment of the menses.

Reports of 43 cases in the practice of Dr. H. I. Boldts,<sup>10</sup> of New York, have been classified by him about as follow :—

1st class, with fifteen patients in whom suppression was referable to sea travel. These were all effectually and permanently benefited.

2d class, with seventeen cases. These were all anæmic or chlorotic patients. Two derived benefit from the use of the permanganate alone, the others derived more or less benefit only by associating tonics with the remedy.

3d class, with eleven well nourished patients, suffering from amenorrhœa from unknown causes. The treatment was almost negative.

Dr. Benjamin Marshall<sup>11</sup> has used the permanganate in 50 cases with good results. He believes that it acts with certainty in about 70 per cent. of selected cases and that it should be given before meals in order to obviate unpleasant gastric effects.

A writer in the *British Medical Journal*<sup>12</sup> finds that the claims of the permanganate and binoxide of manganese as emmenagogues have been fully established, and that the latter has proved less irritating to the stomach.

Dr. Thomas A. Ashby,<sup>13</sup> of Baltimore, is convinced of the usefulness of the permanganate of potassium when administered in a rational manner, with due regard to the etiology of the cases. He regards the remedy as a uterine tonic which acts by provoking a determination of blood to the pelvic organs. He also claims that, like iron, it serves to improve the quality of the blood and is accordingly useful in amenorrhœa of chlorosis and anæmia, although inferior in this respect to iron. He considers Dr. Fordyce Barker's rules of administration the proper ones. The latter administers it in those cases which may be grouped under the following heads:—

1. Young women who exhibit physical depression as the result of unhealthy mental activity, and the like. 2. Women in whom amenorrhœa is the result of sea-sickness. 3. Women who rapidly become plethoric between the ages of 30 and 40 years.

Dr. Macphail<sup>14</sup> commends the use of the manganese preparations in cases of functional amenorrhœa, and finds them especially useful in cases complicated with insanity.

Prof. Upshur<sup>15</sup> has had good results with the use of the binoxide of manganese in amenorrhœa due to defective vascular or nervous supply, and in membranous dysmenorrhœa. In cases where there is deterioration of the blood, he also gives iron. In cases of obesity he gives large doses of manganese to favor waste.

A number of successful cases treated with the permanganate have been reported by Russian practitioners.

Sir James Sawyer,<sup>16</sup> of Birmingham, advocates the use of guaiacum as an emmenagogue, having found the remedy useful in amenorrhœa of uncertain origin. He administers 10 grs. of the powdered resin in a wineglassful of milk every morning before breakfast. The remedy is also useful, he claims, in some cases of dysmenorrhœa.

Dr. Walter Whitehead,<sup>17</sup> of Manchester, Eng., reports a num-

ber of apparent cures from the use of santonine. He prescribes the remedy in a manner wholly empirical, but has found it to succeed where permanganate of potassium failed.

Dr. Arthur R. Reynolds, of Chicago, has treated a number of cases of amenorrhœa occurring in young immigrants just arriving from Europe. He generally finds these patients in a miserable physical condition, as the result of unhygienic surroundings, seasickness and fright during the voyage, as well as mental anxiety afterward. Such cases are readily amenable to cure and he has very satisfactory success from the administration of quinine.

As regards the adverse testimony to the use of manganese preparations, one finds many pronounced expressions of opinion. The *Weekly Medical Review* records with pleasure the expressions of Dr. James Braithwaite of London, who believes that a good emmenagogue has not yet been discovered, even the much vaunted permanganate having been unproductive of good in his hands.

Mr. J. Fletcher Thorne,<sup>18</sup> of Edinburgh, also repudiates the use of permanganate of potassium, claiming that it has been uniformly inoperative.

Dr. Braithwaite<sup>19</sup> has derived much satisfaction from mechanical modes of treatment. He was led to adopt these methods from observing the effects produced upon the menstrual flow by the presence of polypi in the uterus. Acting on the hint thus obtained, he proceeded to introduce small foreign bodies into the uterine cavity when he desired to bring on the flow or increase its quantity, at the same time not neglecting to employ other suitable methods of treatment, such as the hot bath, hygienics and the exhibition of iron, aloes, etc. The foreign bodies used were pieces of hempen ligature and intra-uterine stems, the latter being preferred as less liable to expulsion. While admitting cases of failure, he has still had many successful cases and he regards the mechanical plan as by far the most useful one. He admits the possibility of cervical dilatation aiding in the production of the result, and quotes in this connection Dr. Carstens, of Michigan. He is satisfied that the value of this treatment is unknown to the majority of the profession.

Dr. C. H. Reed has had similar experiences in the mechanical methods of treatment. In the discussion of a paper read by him on this subject, a number of other physicians agreed with him in his conclusions.



METRORRHAGIA AND MENORRHAGIA.

*Definitions.*—Metrorrhagia signifies uterine hæmorrhage and accordingly has a wider meaning than menorrhagia, which denotes an excess of the menstrual flow. The terms, however, are often confounded by writers.

*Etiology.*—The proximate causes of uterine hæmorrhage naturally being very numerous, it will suffice to indicate the groups of causes which tend to produce it. These are,—(1) *Constitutional Causes*, which comprise all those which dispose to hæmorrhage in general. They are generally associated with anæmia. (2) *Local Causes*. These include obstructions to the circulation, whether from inflammation, displacements, degenerative processes, retention of the products of conception, or the presence of growths. It may be said that uterine hæmorrhage seldom occurs independently of diseased conditions of the genitalia.

Dr. John Williams,<sup>20</sup> of London, having made a study of the subject of uterine displacements as affecting the circulation of the uterus, concluded that the latter can be disturbed only with great difficulty by mechanical causes, on account of its peculiar arrangement. The points of entrance and exit of the vessels are at the sides of the organ and are very numerous. In the uterus itself the direction of the blood current is transverse to the longer axis of the organ and perpendicular to its surfaces, so that a ligature might be thrown around the uterus at almost any level without influencing the circulation above or below the constricted point. The only ligature, he says, which could materially alter the circulation would be one including the broad ligament, together with a portion of the uterus, and it is only when a very considerable displacement takes place, such as hernia in the inguinal canal, or the pouch of Douglas, or well marked procidentia, that severe circulatory derangement results; ordinary flexions and versions producing no serious effects. By way of proof he adduces an experiment which he made by stitching the fundus and cervix of a uterus closely together and then injecting the vessels on one side. when he observed that those on the opposite side promptly filled. while a section of the uterine walls revealed a good injection of their vessels.

This opinion, while of great interest, does not seem to accord

with ordinary clinical experience, and as opposed to this view one finds such expressions as those of Dr. James Stirton.<sup>21</sup> This writer believes the uterus to be an organ subject to very great variations of vascularity. It is anatomically isolated, he says, and its blood-vessels are but meagrely continuous with those of the adjacent organs. Variations in vascular tension are most conspicuous in the branches of the two venous plexuses around the cervix. These veins are unsupported and nearly valveless and are provided with thin walls. The upright position of man, involving a perpendicular column of blood in the return circulation, increases the tension, especially in the locality of the two venous plexuses mentioned, while additional impediments may often be traced to diseases of extrapelvic organs, such as the liver, heart, or lungs. Hence rupture occasionally takes place in one plexus or the other. Again, the return current may be obstructed in the uterine mucous membrane, as the result of acute congestion or endometritis, in which case also there may be a great increase of tension in the locality of the cervical plexuses. Here one often finds the origin of hæmatoceles, which take place most frequently in this locality and are within or without the peritoneum, according to the degree of resistance offered by this membrane.

Mr. Bland Sutton<sup>22</sup> contributes a valuable observation with regard to pelvic hæmatocele. In performing laparotomy for the removal of a tumor in connection with the left ovary and associated with painful menorrhagia, he found the ovary occupied by several cysts, one of which had ruptured, the extravasated blood being confined by a loop of omentum which was adherent to the ovary. Upon examining the right ovary he found several more cysts, one of which was ruptured during the operation, permitting the escape of a small quantity of blood.

*Treatment.*—While one cannot well be too cautious in accepting the statements of others regarding cures, it becomes especially necessary to exercise judgment when estimating the value of remedies which are administered in an empirical manner, with little or no regard for the etiological and pathological features of the cases. An enthusiast is altogether too prone to reach illogical conclusions from faulty premises due to lack of accuracy in clinical observation.

The attention of the profession has been frequently solicited

of late in behalf of the claims of *hydrastis canadensis* in the treatment of uterine hæmorrhage, this remedy having been extensively employed in most civilized countries, especially in Germany, where its physiological action has been studied with some care.

Dr. Reynold W. Wilcox<sup>23</sup> has reported at length on the use of this agent, reviewing the physiological experiments by the German investigators and reporting his own experience in 43 cases. Physiological experimentation seems to show that the drug produces vaso-motor contraction, with a rise of blood pressure and concomitant anæmia of the uterus. The writer cites the experience of several European physicians in 100 cases, which included inflammation of the uterine mucous membrane, pelvic inflammation, flexions and retroversions, hæmorrhage of the menopause, subinvolution, tumors, etc. The reports were generally of a very satisfactory character. Dr. Wilcox prescribes the fluid extract by preference in doses of 20 drops three or four times a day, avoiding the use of the alkaloids on account of their varying strength. His own reports embrace 3 cases of fibro-myomata, 7 cases of hæmorrhagic endometritis, 16 cases of subinvolution, 5 cases of climacteric hæmorrhage, 9 cases of pelvic inflammation, and 3 cases of congenital ante flexion. In fibro-myomata he believes that bleeding is arrested by the induction of uterine anæmia and that the necessity of dangerous operations for their removal may often be obviated by the use of this remedy. In hæmorrhagic endometritis the results were prompt and satisfactory, even in cases where curetting had failed. In subinvolution the treatment was so successful that he believes the use of the drug will often remove the necessity for the performance of Emmet's operation. In the cases of climacteric disorder the results were good. In pelvic inflammation, excellent results were obtained and the writer has largely substituted the use of *hydrastis* for his former treatment with iodine and hot water. In uterine flexion the artificial anæmia produced sufficed to relieve the patients of cramps and nervous symptoms generally.

In the discussion which followed the reading of this paper, Dr. E. C. Dudley,<sup>24</sup> of Chicago, and Dr. Van Ness,<sup>25</sup> expressed themselves as being much less enthusiastic in the use of the drug than the writer of the paper.

A Russian physician, Dr. N. A. Jivopistzef, reports good results in 20 cases from the use of *hydrastis*. He believes, however,

that success is only to be expected where the uterus is rigid and enlarged, with its mucous membrane inflamed and softened, or where exudation exists. He finds it quite useless in cases of fibroids and cancer, but confirms a general observation to the effect that gastric disorders are greatly benefited by the use of hydrastis, and especially its alkaloid hydrastin.

Dr. J. M. Fuchs<sup>26</sup> reports the case of a patient with a uterine tumor which had been the cause of profuse menstruation for two years. Upon administering hydrastis as a palliative measure, he was surprised to find that menstruation soon became quite normal. The patient has been under observation for a year and continues to menstruate regularly.

Dr. Henry Garrigues,<sup>27</sup> of New York, has employed the decoction of cotton root in 139 cases of hæmorrhage from various causes, including displacements, endometritis, pelvic inflammations, subinvolution, laceration of the cervix, morbid growths following labor and in hæmorrhage from unknown causes. He combines other appropriate treatment when indicated, but reaches the conclusion that gossypium is productive of good in 9 cases out of 10, and that the decoction is by far the most eligible preparation. He recommends its use particularly in cases of neoplasm, in which he has found that it both checked the hæmorrhage and relieved the pain.

Dr. F. W. Potter,<sup>28</sup> of Wilmington, N.C., reports a case of uterine hæmorrhage which he ascribed to malarial origin and in which the treatment remained ineffectual until he employed large doses of quinine.

Dr. G. W. Davis,<sup>29</sup> of San Francisco, in reviewing the subject of uterine hæmorrhage, finds that pelvic inflammation, displacements of the uterus, malaria and Bright's disease are the most important causes arising in the non-puerperal state, and that treatment should be especially directed with a view to modify these diseases. As regards hæmorrhage at the period of the menopause, he believes that in most cases it can be traced to old neglected lesions which require treatment according to their character.

Dr. R. W. Felkin,<sup>30</sup> of Edinburgh, describes a severe case of paroxysmal metrorrhagia in which, suspecting masked malaria, he obtained most excellent results from the administration of quinine and tonics.

Dr. C. D. Palmer,<sup>31</sup> of Cincinnati, directs attention to the use of ergot, digitalis, bromide of potassium, arsenic, gallic acid, cannabis indica, hamamelis, gossypium, viburnum, hydrastis, and chologogue cathartics. In the discussion of the paper Dr. D. L. Roberts, of Manchester, Eng., said that he had found ergot and gallic acid the two best remedies.

Dr. Fraipont<sup>32</sup> uses iodoform gauze as a tampon in cases of violent hæmorrhage. He finds that, after carefully washing out the uterus, the gauze may be allowed to remain two or three days and that it arrests hæmorrhage by causing uterine contraction.

Dr. Ménière,<sup>33</sup> reviewing an old mode of treatment, prescribes an infusion of urtica dioica (nettle), obtaining excellent results, especially in cases of fibroid tumors and in hæmorrhage following childbirth.

Dr. Henry C. Coe,<sup>34</sup> of Long Branch, reports a case of severe hæmorrhage of unknown origin occurring at the period of puberty. In this connection he refers to the influence of climate in determining uterine hæmorrhage, having observed that women often flow more frequently when at the seaside. It may be here remarked that observations of a contrary nature are not lacking, and that amenorrhœa often seems to be due to the same causes.

Dr. Matthew J. Rae<sup>35</sup> calls attention to blood-casts of the uterine cavity as a source of hæmorrhage. He finds that these occur from a sudden suppression of the menses due to mental or physical shock. As the effects of the shock begin to disappear an oozing of blood takes place and coagulation occurring, the cast is formed. The treatment consists in removing the cast, checking the hæmorrhage and relieving the congestion. For this purpose Dr. Rae gives ergot in full doses, with ipecac, opium or belladonna. In some cases he associates tannin, mineral acids and the astringent preparations of iron with the ergot.

Dr. Alfred Mantle<sup>36</sup> finds that menorrhagia and metrorrhagia often occur in the febrile state, the exciting causes being the quickened pulse and the altered condition of the blood, which becomes less coagulable than usual, as in many cases of zymotic fevers. In two cases reported, he employed general measures applicable to hæmorrhage, but was obliged to resort to the use of the tampon.

Dr. B. F. Baer<sup>37</sup> points out the fact that hæmorrhage of the climacteric is often erroneously regarded as a physiological occur-

rence and accordingly slighted to the patient's detriment. He emphasizes the importance of careful examination in these cases, as advised by Thomas, in order to discover the possible presence of cancer or fibroids.

Dr. F. H. Davenport,<sup>38</sup> of Boston, quotes from a Russian writer who gives the comparative frequency of the causes of uterine hæmorrhage, as follows: Cancer, 25 per cent.; fibroids, 19 per cent.; metritis, 10 per cent.; endometritis, 8 per cent.; abortion and subinvolution, 5 per cent. Dr. Davenport finds ergot very useful when either fibroids or subinvolution are present, while it fails in cases of endometritis. Gallic acid operates satisfactorily in cases of passive congestion resulting from misplacement of inflammatory conditions about the uterus. Iron is often serviceable, especially in young women whose only complaint is excessive menstruation.

Dr. A. B. Carpenter<sup>39</sup> gives excellent advice regarding careful exploratory measures which may often lead to the discovery of tumors, a blighted ovum or a bit of placenta. These are cases in which curetting is applicable. In cases of endometritis, he finds lactic acid a most useful application, as it does not attack a healthy mucous membrane but does destroy fungoid and sloughing tissue. When it is necessary to dilate the uterine canal, he employs Hegar's dilators.

Freudenberg,<sup>40</sup> of Cologne, gives an interesting account of the etiology and diagnosis of internal metrorrhagia in pregnant women, together with reports of two such cases. The partial separation of the placenta allows the possibility of an internal hæmorrhage, which takes place when the force with which the blood flows exceeds that of the intra-uterine pressure; multiparæ are therefore more disposed to this danger than primiparæ. The blood extravasated may be retained in the uterus or be expelled, according to the degree of uterine contraction excited. The symptoms of this form of hæmorrhage are those of any other concealed hæmorrhage, but it is important to note the discrepancy between the duration of pregnancy and the size of the uterus, as well as the impossibility of outlining the fœtal parts where the blood has collected. It is also noticeable that the membranes are much tenser than natural. The condition may be mistaken for hydramnios, twin pregnancy, or, when collapse occurs, for apoplexy, heart disease, etc. If the

hæmorrhage continue, it is advisable to resort to *accouchement forcé*, otherwise an expectant treatment with analeptics may be employed.

#### DYSMENORRHŒA.

Dysmenorrhœa being a symptom of various disorders the true pathology of which is often uncertain, and the term itself being a purely relative one, it scarcely admits an accurate definition. Suffice it to say that dysmenorrhœa is an indication of functional or organic disease of the female generative system, which is expressed in pain coincident with menstruation.

*Etiology.*—By a few writers, obstruction to the escape of menstrual fluid is held to be the invariable cause of painful menstruation. Others attribute dysmenorrhœa to obstruction in the circulation of the uterus. Others lay great stress upon the pelvic inflammations and upon diseases of the uterine appendages, while others look to constitutional disturbances which act indirectly upon the generative system for an explanation of many cases; thus, Emmet believes that anæmia, being conducive to neuralgia in general, is often the cause of dysmenorrhœa; that this general condition expresses itself in painful menstruation when the generative organs are wanting in tone.

Thomas' old classification will serve, although only in a very general way, to indicate some of the pathological conditions which are associated with painful menstruation. He classifies dysmenorrhœa as neuralgic, congestive, inflammatory, obstructive, membranous, and ovarian. The subject, however, cannot be satisfactorily considered without at the same time taking into account almost the entire subject of gynæcology.

*Treatment.*—In a very suggestive and valuable paper by Dr. Robert Bell,<sup>41</sup> of Glasgow, the view is taken that most cases of dysmenorrhœa are caused by endometritis, for he has found this condition present in most of the 1000 cases treated by him in the past five years. He believes that as long as the endometrium is in a healthy condition the menstrual blood remains fluid and is easily discharged; whereas, inflammatory conditions of the endometrium result in the formation of clots which are discharged with difficulty and pain. As a typical case he instances a patient who, after menstruating normally for years, began to have pain at each menstrual period. As the pain increased it was observed that

clotted blood was passed and finally a complete membrane was thrown off at each period. In this case treatment consisted in dilatation of the os internum twice a week, and the application of a saturated solution of iodine with carbolic acid to the endometrium. Vaginal tampons soaked in glycerite of alum and boracic acid were also used. After four months of such treatment, menstruation became normal and the patient soon became pregnant. Dr. Bell believes that the mechanical theory of obstruction as the cause of dysmenorrhœa is a weak one, especially as he is not able to understand how fluid blood should be less able to escape without pain than the mucus which is so abundantly discharged in the intermenstrual period.

In the discussion which followed, Dr. Robert Barnes,<sup>42</sup> of London, said that he did not hold to one condition as the cause of dysmenorrhœa, although he did believe that stenosis of the os externum was one of the most frequent causes, the thousands of cures obtained by incision, proving his opinion. He believes that incision is preferable to dilatation of the os externum by means of bougies, as relieving engorgement and being more prompt.

Dr. Edis,<sup>43</sup> of London, joined in the discussion and related a case of membranous dysmenorrhœa which had been the cause of much suffering for years. His treatment consisted in dilatation of the cervix and the application of nitric acid and iodized thénal to the endometrium. Marked amelioration followed and the patient, who had been sterile, became pregnant. Dr. Edis also approves of dilatation and division of the cervix in many cases.

Dr. Bantock,<sup>44</sup> of London, reported a cure from depletion of the cervix by puncture, with dilatation of the canal and the application of strong carbolic acid.

For the relief of the pain, Dr. Mérière,<sup>45</sup> of Paris, prescribes enemata of thirty grains each of chloral and bromide of potassium.

Dr. Z. T. Dellenbaugh,<sup>46</sup> of Cleveland, reports favorably of the use of antipyrin, which, in large doses, he has found very efficacious. He was led to adopt this remedy from a consideration of the action of antipyrin in relieving hyperæmia of the skin by reason of its influence on the vaso-motor system. His initial dose is fifteen grains.

Dr. T. A. Emmet,<sup>47</sup> in correcting a mis-statement, reiterates



the opinions long entertained by him in regard to the nervous origin of dysmenorrhœa, and predicts that if his views are accepted they will result in a complete revolution in the principles and practices of gynecologists.

A case of membranous dysmenorrhœa occurring in a virgin, and cured by forced dilatation and curetting, is reported in the *Annales de la Société Médico-Chirurgicale de Liège*.

Dr. P. Ménière<sup>48</sup> employs antipyrin in neuralgic and congestive dysmenorrhœa, administering it either by the stomach or subcutaneously. He sometimes uses it in connection with digitalis and ergotine or digitalis and hamamelis. To lessen the pain of hypodermic injections, he recommends the following solution:—

|                                     |          |
|-------------------------------------|----------|
| Boiled water, . . . . .             | S. gram. |
| Hydrochlorate of cocaine, . . . . . | .10 "    |
| Antipyrin, . . . . .                | 1.90 "   |

#### VICARIOUS MENSTRUATION.

This may be defined as a discharge of blood which takes place from some other organ than the uterus, seemingly as a compensation for the arrest of the normal menstrual flow.

Although the great majority of the profession entertain no doubt as to the actuality of vicarious menstruation, there are some who doubt or deny that it ever occurs. This subject, together with that of menstruation in general, has received considerable attention on the part of the British Gynecological Society.

Dr. Robert Barnes,<sup>49</sup> in an exhaustive review of the subject, relates some of the explanations which have been advanced to account for these phenomena, such as plethora, the surplus of blood being discharged at the point of least resistance; a weakened condition of the tissues due to hereditary or other causes; abnormal structure of the vessels in the locality from which the blood is effused; a deprivation of the natural tegument of the organs from wounds, ulcers, etc.; the hæmorrhagic diathesis; nervous influences; a supplementary relation of the various organs of the body, etc.

*Treatment.*—Dr. Barnes summarizes the various modes of treatment, directing attention to the removal of mechanical obstructions, the correction of constitutional derangements which

give rise to the nervous influences bearing directly on the disorder, the treatment of diseased conditions at the seat of hæmorrhage, and concurrently the application of derivative measures, such as bleeding from the foot and leeching of the vulva. The uterus should also be stimulated by injections of hot water and of iodine. Hamamelis, gossypium, digitalis, ergot, iodine, mercury and arsenic are the most useful drugs. Purgatives, diuretics and faradization are often serviceable.

In the discussion, Dr. Wilks held that while vicarious menstruation might be a possibility, he had nevertheless been unable to find a single well authenticated case in substantiation of such an alleged phenomenon. In this opinion Dr. Elder coincided, while Drs. Bantock, Aveling, Murphy, Phillips, Hills, Routh, Mansell-Moullin, Bedford Fenwick, and Mutch expressed themselves as entirely favorable to such views as Dr. Barnes had advanced, and most of them cited cases of vicarious menstruation occurring in their practice.

Dr. R. C. Prewitt<sup>50</sup> cites an interesting case occurring in his practice, in which the patient, in connection with a slight menstrual flow, suffered a periodic hæmorrhage from the lungs. There seemed to be no normal cervical canal, but a very small fistulous opening towards one side of the cervix.

Treatment consisted in enlarging this opening by cutting and dilating and the administration of tonics and hot douches. Normal menstruation soon took place, with cessation of the hæmorrhage from the lungs.

Dr. J. B. Walkinshaw,<sup>51</sup> of Wellsburg, W.Va., relates a case where a patient had a vicarious discharge of blood from the nostrils. Every effort to bring about normal menstruation failed, although monthly venesections prevented the epistaxis and greatly relieved the patient.

Dr. F. W. Samuels<sup>52</sup> reports a case of what he regarded as vicarious menstruation, in which blood was discharged from the mouth. He administered permanganate of potassium with apparently good results, although the patient was under his care only during two menstrual periods.

Drs. MacCallum, of Montreal, Charles T. Parkes, of Chicago, D. T. Nelson of Chicago, and Rodney Glissan<sup>53</sup> report presumptive cases of vicarious menstruation.

## REFERENCES.

1. Brit. Gyn. Jour., 1886. 2. Brit. Gyn. Jour., 1886. 3. Obstet. Jour., London.
4. Brit. Gyn. Jour. 5. Brit. Gyn. Jour., 1886. 6. Med. Rec. 7. An. de Gyn. 8. Glasgow Med. Jour. 9. Am. Pract. and News. 10. Therapeutic Gaz. 11. Therapeutic Gaz. 12. Editorial Cinn. Lancet-Clinic. 13. Maryland Med. Jour. 14. Brit. Med. Jour. 15. Maryland Med. Jour. 16. Birmingham Med. Review. 17. Am. Med. Digest. 18. Therapeutic Gaz. 19. Brit Med. Jour. 20. Trans. Obstet. Soc. of London, 1885. 21. Trans. Obstet. Soc. of London, 1885. 22. Brit. Gyn. Jour. 23. N.Y. Med Jour. 24. N.Y. Med. Jour. 25. N.Y. Med. Jour. 26. Therapeutic Gaz. 27. Therapeutic Gaz. 28. N.C. Med. Jour. 29. Pacific Med. and Surg. Jour. 30. Edinburgh Med. Jour. 31. Am. Gyn. Soc. 32. Jour. Am. Med. Assoc. 33. Gaz. de Gyn. 34. N.Y. Med. Jour. 35. Pacific Med. and Surg. Jour. 36. Lancet. 37. Texas Courier-Rec. 38. Boston Med. and Surg. Jour. 39. Columbus Med. Jour. 40. Cent. für Gyn. 41. Brit. Gyn. Jour., 1886. 42. Brit. Gyn. Jour., 1886. 43. Brit. Gyn. Jour., 1886. 44. Brit. Gyn. Jour., 1886. 45. Jour. de Méd. de Paris. 46. Med. Rec. 47. Med. Standard. 48. Gaz. de Gyn. 49. Brit. Gyn. Jour., 1886. 50. Med. and Surg. Reporter. 51. Cleveland Med. Gaz. 52. Am. Med. Digest. 53. 9th Inter. Med. Congress.

[Undated references apply to journals published in 1887, and original articles can be found by consulting the indexes of the respective publications.]

## DISEASES OF THE OVARIES AND TUBES.

By WILLIAM GOODELL, M.D.

AND

W. CONSTANTINE GOODELL, M.D.,

PHILADELPHIA.

---

### OOPHORITIS.

*Pathological Anatomy.*—Dr. W. Nagel,<sup>1</sup> of Berlin, aims to determine the changes caused by chronic oöphoritis. He has come to the conclusion that small cystic or follicular degeneration is not pathological. Leopold has observed this increase of the Graafian follicles in healthy ovaries, and Prochownick only considers this condition pathological when the stroma exhibits pathological changes. The size of the follicles is not important; they naturally increase in some more than in others, independently of any change in the stroma. Indeed, after inflammatory changes of the stroma have reached a certain degree, the follicles wither. The follicles are healthy when their walls are normal and contain healthy ova, notwithstanding their size or number. Dropsical follicles only exist in stroma that has been previously diseased, and never get to be very large cysts. The walls of these follicles have a tendency to atrophy, so that the fluid is readily re-absorbed. The unilocular, smooth-walled cysts, with serous contents and larger than walnuts, are probably developed from corpora lutea. Rokitsansky has described a case where both ovaries were affected. A corpus luteum cyst appears, unlike hydrops folliculi, to be a primary morbid condition. The stroma was healthy in Rokitsansky's case, and there had apparently been no peritonitis. Dr. Nagel believes that these cysts are more frequent than is generally supposed. A single follicle is not so prone to grow as a corpus luteum, whose structure is vascular, with a tendency to grow rapidly. Dr. Nagel believes that interstitial oöphoritis is an essential condition of chronic oöphoritis, where different stages of inflammation often exist simultaneously. Local peritonitis is not

necessarily a primary condition, though always present when the disease has lasted for any length of time. The affection can commence as acute interstitial oöphoritis, set up by puerperal metritis or by some other disease. When circumscribed local peritonitis is the primary affection, the surface of the ovary is covered by organized peritonitic membranes and the albuginea is much thickened and laminated. The parenchyma may remain even for a year or two unchanged, the primary and mature follicles being found healthy. In other cases, bundles of connective tissue, such as are sometimes found in healthy ovaries, are seen in the parenchyma of the ovaries, and seem to represent Kiwisch and Klob's diffuse parenchymatous or simple hypertrophy, with increased density of tissue.

*Treatment.*—Dr. Sarah E. Post,<sup>2</sup> of New York, advocates the use of the cotton tamponade. She places the patient in the left lateral or genu-pectoral position, and with a Sim's speculum retracting the perineum, carries in a small pad of cotton, using the fingers instead of the dressing forceps for this purpose. Then with the fingers retaining the pad, she withdraws the speculum, re-introduces the blade in front of it and passes another tampon to one side or the other as required. When all have been packed into a secure position, she last places one in front and against the pubis to give leverage and support. The pain, when the ovary is not adherent, is generally immediately relieved. In those cases of chronic oöphoritis especially associated with salpingitis, she recommends the use of the old inflated rubber ring pessary, with the central aperture sufficiently large to allow the cervix to project through it. By support the whole mass is lifted beyond the uterus and surrounding structures, facilitating the discharge of the contents of the tube, and forcibly breaking the adhesions which confine it. In this treatment, the equable pressure of the ring has been more effective and better borne than the tampon of cotton pads. In employing the inflated ring, the patient removes and replaces it herself, and where there is no pain when lying down, it is left out at night. In selecting this pessary, the size should be large enough so that the anterior portion shall be depressed by the pubic bone; the back part then rises to the posterior *cul-de-sac*. If the patient inserts it herself, she should take the knee chest position, when it spontaneously rises to its proper place.

Dr. Wm. Warren Potter,<sup>3</sup> in tamponnement of the vagina,

finds wool or jute even more serviceable than cotton, especially absorbent cottons, which become too inelastic when wetted, either by the medicated fluids in which they are dipped or by the natural or unnatural juices and fluids of the body, which they absorb after introduction. In either case they become too sodden and boggy to avail much, either for support or elastic pressure, and these are the particular indications of treatment to be fulfilled. He suggests that the vagina be first syringed with hot water, then dried and finally insufflated with some appropriate powder, such as bismuth, iodoform, mineral earth or tannate of bismuth (when an astringent is needed) before tamponning is begun, preferring this dry method to the use of glycerate of tannin, iodoform or other analogous material.

Dr. J. H. Etheridge,<sup>4</sup> of Chicago, instead of a number of tampons, uses a single long strip of antiseptic wool which can very readily be carried up by the dressing forceps until the whole vagina is filled. This tampon will remain in position from four to even ten days without any inconvenience as to the odor or irritability of the organ which it supports. He often leaves it in during menstruation with dysmenorrhoea and removes it when the flow has ceased. His opinion as to the greatest field of usefulness of this tampon is in movable ovarian prolapse.

In a discussion before the British Gynecological Society, Dr. Bedford Fenwick<sup>5</sup> advocated the use of some preparation of mercury in the treatment of pelvic effusions. He had frequently employed it in the form of the liquor hydrarg. perchlorid. in from half to one drachm doses thrice daily, and had invariably attained the most gratifying results. When one looked at the firm adhesions binding down the uterus and its appendages, it certainly seemed that nothing but the excavation and removal of the imbedded ovary could possibly relieve or cure the symptoms to which its fixation gave rise. But the compression and injuring material is pathologically only organized or semi-organized lymph,—exactly the same plastic matter, it should be remembered, for the removal of which mercury is even nowadays given in syphilis; so that on purely pathological grounds, its employment might be advised in cases of pelvic effusion; and practically Dr. Fenwick found constantly the greatest advantage to patients from its use. The drug had to be given and taken carefully and patiently. He had again and again found the fixed uterus become mobile, the tender effusion melt

away and disappear. Looking at the danger to life involved in the alternative operation, and also the moral and social effects of the same, he felt that it should never be resorted to until every possible resource of the pharmacopœia had been exhausted, and he earnestly advised the trial of mercury.

#### OVARIAN CYSTS.

*Etiology.*—Dr. T. Gallard<sup>6</sup> discusses the etiology of the affection very fully, especially with respect to the theory which attributes them in every case to a simple derangement in the process of ovulation; in fact an extra-uterine ovulation, the mechanism of which differs in no essential particular from that of extra-uterine pregnancy. MM. Galippe and Landouzy<sup>7</sup> have been studying the pathology of ovarian cysts, and believe they are the result of irritation caused by a parasite. Fluid taken from these tumors was placed in different cultivating mediums, such as ordinary broth, sugared and peptonized broth, peptonized and neutralized broth, human saliva sweetened and peptonized, and human saliva sweetened, peptonized and neutralized. In three days all the cultures proved to be fertile. The microbes were found to be spherical micrococci united in pairs, which were seen either in masses or long chains; there were also micrococci of much smaller size, and rods either isolated or united in pairs. When sown in tubes of gelatinized broth, they produced colonies. MM. Galippe and Landouzy recommended that the etiology of tumors should be studied by seeking for parasites in the substance of the tissue.

*Diagnosis.*—Dr. Paul F. Mundé,<sup>8</sup> in a discussion at the Medical Society of the County of New York, said that he had noticed a feature which he deemed worthy of mention: that is, when the tumor is a myoma, the abdominal walls are thick, but that in ovarian cysts, which grow more rapidly, the abdominal walls are thinner. Dr. Mann, of Buffalo, doubts whether Dr. Mundé's suggestion would be proved of very much value.

Dr. Henry T. Byford<sup>9</sup> says that ovarian tumors have frequently been mistaken for pregnancy, even after the tumor has been exposed to the eye, and reports a case in which this was occasioned by a horn of the uterus with the Fallopian tube hypertrophied and drawn over the anterior surface of the cyst.

M. Quenu<sup>10</sup> concludes that ascites is rare in uterine tumors,

whatever their nature, frequent in solid ovarian tumors, and is the rule in papillomatous cysts, the fluid in these cases being secreted directly from the vegetations. Ascites will also come from a small perforation made spontaneously in the cyst-wall, and from pressure of the sac on the intra-abdominal blood-vessels. A case in point of double papillary cyst, accompanied by ascites, is given by Terrier,<sup>11</sup> who insists that abdominal fluid is always found in these cases. In corroboration of this view Gars<sup>12</sup> reports a case of papillomatous cyst of the ovary, accompanied by dropsy of the peritoneal cavity. Bantock<sup>13</sup> gives a case of solid tumor of the ovary, associated with dropsy, and deems this form of growth to be more or less malignant.

Dr. Larabrie<sup>14</sup> says: In some cases, by aspiration, we may determine the character of the fluid, whether ascitic or ovarian. The density of the ascitic fluid, according to Spiegelberg, is very low, scarcely even more than 1.010 to 1.015, while the average density of ovarian fluid varies from 1.018 to 1.024. Again Waldeyer has shown that in ovarian cystic fluid, paralbumen is present, and never in ascitic fluid. This fact is also recognized by Koeberle and Duplay. Dr. Larabrie thinks that a chemical analysis of the fluid should always be made, but that the presence of paralbumen, while excluding the idea of ascites, does not necessarily prove that the fluid is ovarian, since Schetelig has found this albuminoid in a tumor of the kidney.

Dr. Bedford Fenwick,<sup>15</sup> in a discussion before the British Gynecological Society, said that in the differential diagnosis, a knowledge of the condition of the heart was of prime importance as regards its strength or weakness; for sometimes an ascitic fluid supposed to be due to peritoneal mischief, is caused, not by the abdominal tumor, but by the cardiac feebleness, and consequent "inertia a fronte." When such is the case, the œdema is general, while in the former the lower limbs are rarely involved. The condition of the heart, liver and lungs should always be inquired into before a positive diagnosis is made.

*Treatment.*—While the tumor can be reduced for the time being by tapping, still the dangerous results of such a practice show that it cannot be too severely condemned. The causation of adhesions making a future operation difficult, and the risk of introducing septic material into the peritoneal cavity, should make us perform



this operation in none but exceptional cases. Dr. William Goodell says: I cannot too strongly condemn the too prevalent habit of indiscriminate tapping. Apart from the danger of exciting inflammation and septicæmia, and of producing adhesions, tapping may cause the whole abdominal cavity to become infected by the fluid of a papillary or a colloid cyst.

Dr. F. Semeleder,<sup>16</sup> in a paper read before the Academy of Medicine of Mexico, on electrolysis in the treatment of ovarian and parovarian cysts, says that in the forty-five cases upon which his paper is based, his results were very satisfactory. He believes that a trial of this method should be made before resorting to operative measures.

*Intra-ligamentary Cysts.*—In a paper on this subject Dr. William Goodell<sup>17</sup> stated that there are two kinds of cysts encapsulated by broad ligament. The one is a unilocular, papillomatous cyst; the other a multilocular papillomatous cyst. Both contain clear fluid. The former is probably a cystic degeneration of one of the imbedded vertical tubes of the parovarium,—which represents the rudimentary sexual remnants of the Wolffian body. It is usually more encapsulated by the broad ligament than the multilocular variety, but the connective tissue is looser and less vascular.

The multilocular intra-ligamentary cyst has but a few daughter cysts, each cyst distended by a clear limpid fluid and containing exuberant, firm papillomatous growths. Its proneness to ingraft itself upon pelvic organs and its firm and vascular union to its capsule of broad ligament, make its removal far more difficult than that of the unilocular variety. Its origin is questionable, although the presence of papillary ingrowths would point to foetal tubular relics as the source. Some attribute it to cystic degeneration of supplemental ovarian tissue often found imbedded in the broad ligament at a distance from the ovary. Others refer it to the tubular relics in the paro-öphoron. Lastly, Doran attributes it to stray foetal relics in the hilum of the ovary. Since this theory meets every characteristic of this tumor, viz., the papillary ingrowths, its multilocular character and its investment by broad ligament, Dr. Goodell was inclined to accept it. The tumor did not develop into the peritoneal cavity, but growing inwards and into the broad ligament it parted asunder the two peritoneal folds of the latter.

As it burrowed upward it stripped off the peritoneal coat of the womb and bladder, fusing itself to these now naked organs by continuity of structure and not by mere contiguity. Hence in the operation for its removal the womb was liable to be badly wounded and the bladder torn open. Burrowing downward it uncovered and soldered itself to the ureters, the great pelvic vessels and the rectum, making its separation here very dangerous and sometimes impossible. Mounting upward from this region, the sac goes in between the two folds of the mesentery, meso-colon, and meso-cæcum, and prying them apart engrafts itself upon these viscera. In these cases a portion of the cyst must be left behind, as the union is too integral to be severed. Another characteristic is the proneness of the cyst wall to burst and to infect the whole peritoneal cavity with papillomatous poison. Whether this is always malignant is doubtful, for he had seen patients wholly recover, whose entire peritoneal cavity was studded with papillary growths. On the other hand he had had them die in a few months after the operation.

The signs of an intra-ligamentary cyst were immobility and low descent of the sac, vertical elongation of womb and bladder, embarrassment in micturition and in defæcation, pelvic pains, unsymmetrical abdominal development, and resonance on percussion from bowels carried up in front.

Gerster<sup>18</sup> and Fenger<sup>19</sup> each report cases of intra-ligamentary cyst and refer its causation to parovarian origin; but this does not explain the presence of daughter cysts, which are usually found in intra-ligamentary cysts, and are absent in parovarian cysts, which are single-chambered cysts. Terrillon,<sup>20</sup> on the other hand, attributes these cysts to development of the subsidiary ovarian stroma, which lie between the layers of the broad ligament in about six women out of a hundred. But this view does not explain the presence of the papillary growths of intra-ligamentary cysts, which pathologists generally attribute to the vertical tubes of fetal relics.

*Treatment.*—The operation for the removal of an intra-ligamentary cyst demands great experience on the part of the physician and taxes all his pluck.<sup>21</sup> These are the cases which are liable to die either on the table or a few hours afterward from shock. Formerly when a cyst was found to be intra-ligamentary, the in-

cision was closed and the case abandoned. Now, thanks to Miner, of Buffalo, the surgeon needs rarely to be foiled.

Since the bladder is often dragged upward and then lies directly under the line of the incision, great care must be taken not to wound it. The cyst should then be emptied, but it must not be lessened in size by the introduction of the hand and the breaking up of daughter-cysts, because the flow of blood would be too great, and papillomatous material might escape into the abdominal cavity. For the latter reason the opening made by the trocar should be securely closed. The collapsed sac is now drawn out of the abdomen and the capsule is divided, little by little in a circle on a level with the edge of the abdominal incision. The sac wall is then enucleated so as to leave an uninjured cup-like cavity. To do this with the least amount of hæmorrhage, the incision should begin at the lateral border of the sac, where the spermatic vessels lie. After these are secured, the incision is extended to the site of the womb, where will be found the uterine arteries, which will also be cut and secured either by ligature or by pressure forceps. As the surgeon advances, he will have to tie or clamp many blood-vessels. The attachment to the womb is left for the last, and it can then usually be brought outside of the abdomen, when it may often be converted into a sort of pedunculated attachment, which can be ligated *en masse*. Often the whole sac is shelled out of its capsular nest, without any approach to a pedicle. In the deep portion of the enucleation great care must be taken not to injure the ureters, rectum or the large pelvic vessels. When firm adhesions to important viscera are met with, the adherent portion of the sac must be cut off and left behind, but its secreting layer should be peeled off.

The vast cavity of the empty capsule is treated in one of the following ways, each aiming to exclude it from the peritoneal cavity: (*a*) the edges of the capsular cup are attached to the border of the abdominal incision and a drainage tube is put in; (*b*) through the floor of the intra-ligamentary wound a catch-forceps is thrust into the vagina. There it is made to seize a winged rubber drainage-tube, which is drawn up into the capsular cavity. The edges of the capsule are now trimmed and sewn with gut, the one to the other so as to exclude its cavity from that of the peritoneum.

Whenever neither of these modes can be adopted one large drainage-tube or even two of them should be introduced into the pelvic cavity.

Fenger<sup>22</sup> had four cases, in two of which he was able to enucleate the tumor; one of these died. In the other two, the sac could not be removed, so its opening was stitched to the abdominal incision, and Miculicz's drainage used. They both recovered. Miculicz's drainage consists of a circular piece of iodoform gauze, with a stout thread fastened to the centre. This is folded into a pouch with the thread inside. It is then pushed down into the cyst and the pouch packed with iodoform gauze. When the discharge ceases, the packing is removed and the pouch pulled out by the thread.

*Parovarian Cysts.*—Dr. A. Reverdin<sup>23</sup> reports a case which was cured by two tapplings at an interval of two months. A very tight binder was applied. The cyst contained forty litres of fluid at the first tapping and twelve at the second. It did not afterwards refill, and the patient remained cured after the lapse of two years. Terrillon,<sup>24</sup> on the other hand, considers the cure of a parovarian cyst by tapping as "absolutely exceptional," and that sooner or later its extirpation will have to be resorted to. In his hands the radical operation has been very successful, for out of 20 cases all recovered, although in 4 the sac could not be removed and had to be treated by a drainage-tube. In the reporter's opinion,<sup>25</sup> the great objection to repeated tapplings of a parovarian cyst, is the tendency to convert benign growths into malignant ones, and the danger of subsequent infection of the peritoneal cavity by a protrusion of papilomata through the puncture.

According to MM. Malassez and de Sinety,<sup>26</sup> parovarian cysts come from supplemental ovarian stroma, so frequently found in the broad ligament and not from the organ of Rosenmüller. But this source does not explain the fact that they usually have but one chamber.

*Dermoid Cysts.*—Dr. Christian Fenger<sup>27</sup> says: The etiology of dermoid cysts is wrapped in considerable obscurity, and even to-day the explanation of their development is but pure theory, although perhaps satisfactory to most. The two most rational explanations are the one of Herschl and that recently adopted by Waldeyer. The former believes that they originate in small por-

tions of the epiblast displaced during embryonal development and located in the mesoblast. The presence of dermoid cysts in the testicles and ovaries is explained by the fact that they are developed from a part of the embryo, the so-called "axenstrang" in which all the germinal layers are included. This explanation is in conformity with Cohnheim's theory of the origin of all new formations from an heterotopic group of embryonal cells aroused into formative activity.

Waldeyer contends that epiblastal cells of the ovary, able to be transformed into the ovum with all its formative possibilities, may enter into an abnormal formative activity and produce a dermoid cyst. This would not explain the presence of dermoid cysts in other places besides the ovaries, and is therefore not as acceptable as Herschl's theory. A dermoid cyst is always a monocyst and seldom multiple. In the rare cases where there are more than one, we may expect to have had more than one embryonal matrix from each of which independently of each other, a cyst has been developed.

Christian Fenger<sup>27</sup> says: These cysts contain a peculiar creamy, sebaceous matter and hair, sometimes short, but often in long, wavy tresses. Besides this, we have in from 20 to 50 per cent. of the cases, teeth inserted in the wall of the tumor or in pieces of bone imbedded in the latter or finally free in the cavity of the cyst. The number of teeth, usually few, may be multiplied to many hundred. Peculiar small, soft masses, very much like butter, floating in the contained liquid of the cyst, are sometimes found. These butter-like masses are composed of amorphous fat, degenerated epithelial cells, cholestrine crystals and hairs.

Baumgarten<sup>28</sup> reports a remarkable case of dermoid cyst, which, in addition to bones, teeth, hair and fat-balls, contained two bodies as large as cherries, very similar to rudimentary eyes. Doran<sup>29</sup> asserts that dermoids of the omentum are probably never primary, but are really ovarian dermoids which have been separated from their pedicles. This opinion is sustained by Bland Sutton.<sup>30</sup> The coexistence of carcinoma and a dermoid cyst in the same ovary is the subject of a communication by Krukenberg,<sup>31</sup> who has collected eight examples. In these cases the stroma exhibited marked carcinomatous degeneration.

Dr. Fenger<sup>32</sup> says: "As a rule we regard a dermoid cyst as

being a new formation, and a malignant character is here a rare exception. We make a distinction between malignancy of a dermoid cyst, *per se*, and malignancy from a combination of dermoid cysts with carcinoma or sarcoma. The malignancy of a dermoid cyst, as such, is rarely seen."

Kolaczek relates a case operated upon by Martini in which, besides a common dermoid cyst with a perfectly smooth surface, there were found in the walls of the peritoneal cavity, small nodules in great number, the size of a millet seed and of a yellowish color. Many of these little tumors had a light colored hair sticking out from their centres into the peritoneal cavity. Analogous ones were seen in a case operated upon by Billroth, reported by Fraenkel. The malignancy of a dermoid cyst from combination with carcinoma, sarcoma and myoma, originating in the tissues of the cyst, is not so very seldom met with, and has been observed more commonly of late years because a more minute microscopical examination is made now than formerly. Olshausen mentions, as bearing on this subject, a statement of Doran, that he had seen in several instances malignant tumors of the abdominal cavity follow extirpation of dermoid cysts.

Dr. Poupinel<sup>33</sup> describes the following tumors, intermediate between mucous and dermoid cysts and uniting in themselves the characteristics of both forms: 1. Mixed cyst, mucoid, dermoid, piliferous and dentiferous; 2. Dermoid and mucoid; 3. Tumor of ovary or broad ligament containing fibro-myxomatous tissue, striped muscular fibres and epithelial tubes; 4. Ovarian, mucous tissue mixed with bony, fatty, epithelial and muscular elements. The cavities of the cystic part were lined with the most varied forms of epithelium, cylindrical, goblet, pavement and ciliary. After the extirpation of the ovarian tumors, secondary growths, of two kinds, were developed: (a) carcinomatous, multiple, (b) a single tumor, the largest found, which presented the same appearance as the epithelial part of the ovarian growth. 5. Ovarian, dermoid containing hair and teeth; 6. Multilocular dermoid; 7. Dermoids of both ovaries.

His cases demonstrated that leaving aside hydatid and hemorrhagic cysts and hydrosies of the Graafian follicles, it is possible to find in a single ovary, cysts lined with different kinds of epithelium. Generally they are epithelia of the mucous type, the investment

consisting of cylindrical, cubical, goblet or ciliary cells. Sometimes the cells are regularly of the same type; others are of various kinds, more or less mixed. Ossification, which occurs often in mixed tumors, is less common in pure dermoid cysts and the study of mixed tumors shows this interesting fact, that the osseous plates are not necessarily connected with the dermoid portions, but may be absolutely independent of them. Also in the stroma of mixed or dermoid cysts may be found smooth and striated muscular tissue and nerves (teratomata of Virchow). Dr. Poupinel describes four cases of peritoneal metastases from dermoid cysts. The most instructive is Moore's<sup>34</sup> case, in which the secondary cysts were still in connection with the primary cyst by slender pedicles. The author concludes that these cysts are rare in children and occur in adults in the following manner: mucoid 34 to 45 years; mixed 15 to 25; dermoid 20 to 30.

#### OTHER TUMORS OF THE OVARY.

Graily Hewitt<sup>35</sup> says that collections of blood may be formed in the ovary, generally in the Graafian follicles. This cyst may rupture into the peritoneal cavity, giving rise to peritonitis. Thomas quotes Kiwisch as saying that these collections of blood may reach the size of a child's head.

Prof. Freund,<sup>36</sup> in a recent lecture, related the history of a girl of 18 years, with malignant disease of both ovaries. On the operating table the ovaries were found to be so adherent to the uterus that all of these organs had to be removed together. When this had been accomplished, a carcinomatous nodule was discovered in a fold of the small intestine. Preparations were made to exsect this portion of the bowel, when a more careful search revealed a large metastatic growth in the liver. All further operative interference was abandoned, and a rapidly fatal course of the disease was prognosticated. But to the surprise of all she recovered and gained over twenty pounds in weight. From such a case as this, Prof. Freund argues against the constitutionality of carcinoma from its very beginning, since, had this girl been encumbered with constitutional disease, she would not have gained in health and strength and felt perfectly well for months after the operation. He declares that while carcinoma remains local, with no infection of the lymphatic or circulatory apparatus, and when not interfering

with the function of any important organ, the surgeons should follow it relentlessly into almost every organ of the body.

Dr. A. W. Johnston<sup>37</sup> urges the urgent necessity of complete extirpation in all cases of papillomatous tumors of the ovary, even when there is extensive involvement of the whole peritoneal cavity, for he says: "There is not only microscopic but clinical proof that these warty looking tumors, though to the naked eye so much alike as to be undistinguishable, still embrace very different conditions. It has been shown that early and thorough removal cures about 10 per cent. of carcinoma of the mammae, and may we not expect a like result from the ovary?"

Double sarcomatous ovaries were found by Monprofit<sup>38</sup> at an autopsy. One of them was intra-ligamentary, the other free. There was no ascitic fluid present.

Prof. Wm. H. Welch,<sup>39</sup> of Johns Hopkins University, in a letter to Dr. Wilson, of Baltimore, says: "I have repeatedly found cancerous nodules in papillomatous cystoma of the ovary, which apparently produce no metastases unless they grow through the external wall of the cyst."

Prof. Leopold,<sup>40</sup> of Dresden, says that in 116 ovariectomies, 26 malignant tumors were discovered, or 22.4 per cent. This somewhat exceeds Schroeder's statistics as referred to by Cohn, who had in 600 ovariectomies operated 100 times for malignant tumors, or in 16.6 per cent. of the cases. The chief diagnostic symptoms in this class of cases, are the appearance of the disease in young subjects, early and often complete cessation of the menses and rapid growth, together with bloody ascites. Both ovaries are generally affected, and all the glands of the pelvis are infiltrated. Debility soon sets in. Leopold concludes that every growing ovarian tumor should be removed as soon as possible, and especially if the disease is bilateral. Even a proliferating tumor of the ovary is to be removed immediately and exploratoryappings should be avoided as involving a risk of spreading malignant growths.

Mr. Lawson Tait says: "A purely fibrous tumor in which the follicular element does not enter, has yet to be described." Dr. Greig Smith, after stating that these tumors are very rare, and almost never met with, says: "I have, however, successfully removed a solid ovarian tumor as large as a child's head, in which repeated examination by a competent histologist failed to show



any other histological element than pure fibrous tissue." Drs. Mann and Coe also describe cases.

Tait<sup>42</sup> states that uterine myoma frequently depends upon diseased ovaries, and that the removal of the latter will cure the tumor. He cites the case of a girl who had a uterine fibroid which, on the removal of an ovarian cystoma, disappeared entirely, the remaining ovary being sufficiently healthy to enable her to become a mother.

Vanheeuerswyn<sup>43</sup> describes an interesting case in which an ovarian cyst had been removed by a surgeon, who left in the pedicle a small portion of the secreting surface of the cyst. Four years later the cyst was reproduced and had to be removed.

According to Olshausen,<sup>44</sup> Weinlechner has observed the formation of a tumor from the pedicle of an ovarian tumor which had healed in the abdominal wound. Weinlechner removed the growth after it had attained the size of an adult head, nine months after the first operation.

Dr. Hayes,<sup>45</sup> before the Harveian Society of London, said that he thought that the so-called "cirrhotic" ovary, especially where menstruation had ceased, was the result of the decline of menstrual life or perhaps caused by the adhesions with which the ovary was surrounded.

#### OVARIOTOMY AND OÖPHORECTOMY.

Two papers of great interest, because of widely divergent views, were read before the British Medical Association, the one by T. Savage,<sup>46</sup> of Birmingham, the other by Thomas More Madden.<sup>46</sup> The former contends that the removal of the normal ovaries may be justified in a very few cases of pelvic deformity, in which the birth of a living child is impossible, or might reasonably be expected to prove fatal to the mother. They may also be sometimes removed to check the development of a uterine myoma. Apart from these cases, he believes that in nearly every instance where the operation is called for, the capability of maternity has already been destroyed by some abnormal condition of the tubes or the ovaries. The most frequent conditions giving rise to indications for the operation are (*a*) a localized peritonitis, glueing together in various degrees of intensity the intestines, omentum and appendages; (*b*) a pelvic peritonitis, glueing the tubes and ovaries to each other and to the pelvis, or to the folds of the broad

ligament, and generally occluding the fimbriated extremities of the tubes; (c) causes operating from the interior of the tube, such as the escape of blood through the tube into the pelvis, or the extension of gonorrhœal poison into the tubes and through them into the ovaries. The first two are of greater frequency, coming from septic poisoning at an abortion or at a confinement. The history is usually clear in pointing out the source; as, for instance, a woman who has been previously healthy and has borne children, has a labor or a miscarriage, followed by inflammatory symptoms or by a slow getting up. Thereafter she is sterile and more or less of a chronic invalid, and in most cases the enlarged tender organs are to be felt.

Gonorrhœa is another potential factor, and however mild, is liable to cause a serious, nay even fatal, pyosalpinx. It is as fully proven in its sequelæ in women as in a few men.

The therapeutics of this subject is far in advance of its pathology, and by therapeutics the author limits himself to successful treatment by operation. What we need to know is the significance of atrophied or cirrhotic ovaries, and of enlarged ovaries, whether persistent or temporary, œdematous or cystic. Where is the line to be drawn between cystic disease of the ovaries and cystoma? Is there not sometimes a permanent condition of the broad ligament and tubes corresponding to varicocele in the male, which disables the patient from leading an active life, and therefore justifies removal?

He admits the difficulty of diagnosis in tubal disease, a difficulty which he thinks will never fully be removed. In some cases, all the pelvic organs can be mapped out by double palpation, and a "tube case" unhesitatingly made out. Then there are others in which we have to rely on the clinical history and on the subjective symptoms of pain alone. There are others, again, the majority, which present such objective features as metrorrhagia, an enlarged womb, and a lateral fullness, lump or tumor. In the acute and subacute forms of pyosalpinx, the temperature is a guide, but in the chronic form, when the pus has become inspissated, the temperature is rarely above the normal. The probability, or the recognized possibility, of the bursting of a pyosalpinx, is enough in itself to warrant an operation.

He concedes the fact that sometimes in fibroid tumors of the

womb, it may be impossible to remove all the ovarian stroma, and menstruation may thereafter continue; but he has had a case of complete removal of the appendages in which menstruation continued, though not so profusely.

With regard to the performance of the operation, there is every variation from the extreme ease to extreme difficulty. Without adhesions, no mortality should occur, other than what is outside of and beyond preventable causes, as tetanus, etc. If the inflammatory symptoms are recent, the adhesions are easily severed, and the operation is easy and safe; but in cases of long standing, in which the appendages are glued to each other and to the pelvis by tough fibrous bands, the operation is one of great difficulty, demanding experience and the *tactus eruditus* on the part of the physician. In some cases the operation cannot be completed, and then it would be wiser not to attempt the removal of the appendages; for if the operator once begins to break up the adhesions, he ought to go on and complete the operation. The bleeding set up by the tearing of old adhesions is often great, but it is usually controllable by sponge pressure, the insertion of a drainage-tube and the pressure of the binder.

In view of the chronic invalidism, sterility, lasting pain and inability to discharge the duties of life, we are justified in advising an operation much earlier than was deemed right a few years ago, especially as the adhesions will not then be so firm. In point of difficulty of performance, the author deems the operation for the removal of an embedded ovary to take the first rank. Next to it comes the removal of tubes distended with pus, and still in the acute or subacute stage of inflammation. He advises the short incision of one inch and a half to two inches, because then only a limited intra-abdominal area will be disturbed, and the intestines will incommode the operator less.

From this warm defense of the operation of oöphorectomy let us now turn to as warm an attack on it by Dr. Thomas More Madden. While conceding that certain cases exist in which the uterine appendages should be removed, he believes that there is superabundant room for consideration with regard to the expediency of the general employment of the radical operation as a rule of practice. The increased frequency of the operation is clearly evinced in recent medical literature. In one provincial hospital,

one hundred and eleven women had been deprived of both ovaries during 1885. Oöphorectomy is now suggested as the panacea for all the ills from which unfortunate women suffer, and their ovaries are removed with as much impunity as the butcher spays his sows, and with the same consideration for the wishes of the patient.

If, then, these operations are to go on with increased frequency for the next decade, there will be a very considerable number of our female population deprived of an essential part of their distinctive sexual and reproductive organization. But before this happens, the operation of oöphorectomy should be considered in all its social, ethical and medical aspects.

It cannot be lost sight of that the ovaries are to woman what the testes are to man, and that by their complete removal in each sex the individual is unsexed, viz., deprived of reproductive sexual power. The woman is, in fact, spayed or castrated, in spite of the scientific terms used to describe this operation. It must therefore be obvious that such an operation should not be resorted to without the patient's concurrence and full knowledge of the consequences.

From his early experience as a demonstrator of anatomy, he feels qualified to assert that serious and dangerous affections of the tubes and ovaries are by no means so frequent as they are represented to be, he having met with only one such case. Of course the many post-mortem examinations which he had made disclosed many cases of disease of the uterine adnexa, but comparatively few of them were of such gravity as to call for operative interference. In his opinion, the most frequent cases of tubal disease were due to gonorrhœal infection, catarrhal infection, sexual over-irritation, or the extension of septic disease through the tubes after parturition. But it appeared to him beyond question that some cases of this kind end by resolution or are curable by purely medical treatment; while in other instances, the abscesses and exudations may burst into adjoining hollow viscera and thus escape *per vias naturales*. Having met in his own practice with cases of inflammation and hydro-purulent exudations in the uterine appendages, which proved amenable to ordinary treatment, he fails to see the expediency of resorting to operative treatment until less serious measures have been tried without benefit.

He is opposed to oöphorectomy in reflex ovarian disorders, believing their true starting place to lie in remote ovarian com-

plaint, constitutional condition or cachexia, of which the ovarian complaint is merely the local expression or result. Hence the cerebro-nervous disturbances, although unquestionably connected with ovarian irritation, can hardly be cured by local operative treatment; that is to say, until all predisposing constitutional causes, whether strumous, syphilitic or gouty, have first been recognized and appropriately treated, no radical measures should be resorted to. In support of these views, he quotes H. C. Coc's statement that "there are not a few women now attending the various clinics in New York who have had their ovaries and tubes removed, and yet who complain of precisely the same pain as before; in fact I can recall cases in which, although the menstrual disturbance is wanting, the pain is more severe than it was before."

While admitting that oöphorectomy for the arrest of the growth of uterine fibro-myomata is a suitable operation in a few cases, he is far from agreeing with Tait and Thornton, "that the moment uterine myoma is discovered in a patient under 40, her uterine appendages ought to be removed." He has never seen a death caused directly by a uterine myoma, and as they grow very slowly and are often amenable to therapeutic treatment, the cases are rare in which the removal of the appendages is needed. Yet in hæmorrhagic or painful cases, or in those rapidly growing, he would not hesitate to operate, provided other and less heroic measures had been tried. Such cases are, however, to him very exceptional, as he very successfully uses the liquor ergotæ both by the mouth and hypodermically, together with potassium iodide. When these measures have failed, he has secured great benefit to his patient by sending them to those iodated or bromated spas which he has described in his work on the subject.

The mooted point among gynecologists is whether we are justified or not in depending entirely upon the objective or subjective symptoms. Is it absolutely necessary to find some pathological conditions in the uterus or its appendages, which will render the operation justifiable? Hegar<sup>47</sup> holds the latter view. He says: "Castration is indicated in anomalies and disease of the sexual organs, which cause immediate danger to life or terminate fatally in a short time, or are followed by long continued progressive illness, which interferes with the enjoyment of life and ordinary duties. At the same time it is supposed that all other methods of

treatment would either prove useless or had been tried unsuccessfully, while removal of the ovaries would relieve the disease."

In view of "the mutilation entailed by this operation, which is particularly offensive to sentiments cherished by all civilized nations, and which reduces woman to the condition of a female eunuch," in view also of the fact "that 'brilliant cases' have taken two or three years for the 'brilliant' results to become manifest," in which time a large percentage of those operated on would have got well without operation," Dr. J. E. Burton,<sup>48</sup> in a paper read before the International Medical Congress at Washington, lays down the following rules for its performance: (1) after long treatment by less heroic and radical measures; (2) after consultation with colleagues; (3) after full explanation of the proposed operation and its results to the patient herself and her nearest friend, such as husband, mother or father. As regards the operation itself, it is justifiable in (1) rapidly growing or bleeding myomata, after other treatment patiently carried out has failed; (2) pyosalpinx, if life is threatened by repeated attacks of peritonitis, or if, in consequence of pain from adhesions, the patient is incapacitated from earning a livelihood. Pyosalpinx *per se* does not call for the operation, because either the purulent sac may remain quiescent and harmless or the pus may become inspissated, or indeed it may be wholly abolished, as in the anterior chamber of the eye. Pus does not invariably find an exit by bursting. 3. Chronic ovaritis (especially inflammation of the albuginea, when Graafian vesicles cannot burst through), when the pain is fixed and constant, and months have been spent in unavailing treatment.

4. Perimetritis, which, although it may not be dangerous to life at the time, may render the patient a permanent invalid. The ovaries may be wholly embedded by inflammatory growths, and give rise to agonizing pain at the periodical menstrual congestion, through compression.

5. Cystic degeneration of ovaries, with great and persistent pain. In this form of disease the ovary will probably be much enlarged, and it will be wise to wait until such an enlargement is found.

6. Neuroses distinctly of ovarian origin that have withstood years of treatment in which the symptoms justify so serious an operation.

The operation is not justifiable in—1. Myomata, except as noted. 2. Pyosalpinx, if the disease has become quiescent, if pain and fever have subsided and the pus has become inspissated. 3. Hydrosalpinx at any time, unless an associated parametritis demand removal of the parts. A less radical operation will usually suffice, as this is not a disease that jeopardizes life. The operation is inadmissible unless the patients themselves, after full explanation given, elect to have it done. Even in such cases, it is probable that an operation short of castration will answer the purpose, such as aspiration, or cutting out a portion of the cyst wall. 4. Perimetritis, unless the disease promises to render the patient a permanent invalid. 5. Ovaritis, except under conditions noted above. 6. Cystic degeneration of ovaries, except under conditions noted above. 7. Hæmatocele and hæmatosalpinx under any conditions. Laparotomy and drainage may be called for, but removal of organs never. The same applies to ectopic gestation.

This paper gave rise to a heated discussion between the author and Lawson Tait,<sup>49</sup> in which the latter makes the following assertions: "The absolute impossibility of diagnosing the nature of the contents of the tube before their removal in any case, or indeed after the removal of the tubes themselves, and to determine whether the case ought to be classed as pyosalpinx, hydrosalpinx or hæmatosalpinx. Again, he cannot discover that the sufferings of pyosalpinx are greater than those of hydrosalpinx, and he inclines to the belief that the latter is the earlier stage of the former, and that hydrosalpinx does jeopardize life. That no dependence whatever can be placed on the temperature chart for diagnosis of pus, nor have rigors ever been observed as a prominent symptom in his cases of chronic pyosalpinx; and that therefore no diagnosis can be made on that score between pyo- and hydrosalpinx. He further contends that in hæmatosalpinx, and in intra-peritoneal hæmatocele, which to him is always the result of ruptured Fallopian pregnancy, the involved tube should be removed.

J. K. Thornton in a paper on oöphorectomy, gave a list of 27 cases without a death. Only one was a complete failure in so far as restoration to health is concerned. The causes predisposing to ovarian disease were discussed, and especially specific fevers, as typhoid and scarlatina. In such cases he deemed local treatment

absolutely useless. The pathological condition of the ovaries removed were grouped under three headings: 1. Large œdematous ovary, with increase in all its elements, with follicles maturing all at once, the majority never reaching the surface for rupture, owing to thickening of tunica. 2. The small cirrhotic ovary with more or less absence of ovaries. 3. The small cystic ovary from which the stroma has disappeared, the organ being a mass of thin-walled cysts. He was confident from his observations, that menstruation depended on ovulation; and that when the ovaries were cleanly removed, menstruation ceased and the woman was unsexed.

In commenting on this paper, Heywood Smith stated that, according to his own observations, it was not true that a woman, after this operation, was unsexed. In nearly all his cases, he had found the natural feelings not at all interfered with, and in one case they had been increased. Dr. Playfair believed that oöphorectomy should rarely be resorted to in functional neuroses. In one grave case of hystero-epilepsy, greatly aggravated in the menstrual epoch, he had removed the tubes and ovaries, but with no appreciable result in the neurotic features of the case.

Terrillon<sup>51</sup> has had a case of acute insanity cured by the removal of an ovarian cyst together with the sound ovary. In this case the pedicle had become twisted, causing much pain and also peritonitis. The reporter has had several successful cases of the same character; but in his experience, the prognosis is far more favorable when the insanity culminates at the monthly fluxes, and there are periods of sanity in the intervals.

Championnière<sup>52</sup> defends the operation of normal ovariectomy (Battey's operation) and gives three instances in which it was performed successfully for nervous attacks caused by menstruation. The conclusion adopted by the Obstetrical and Gynecological Society of Paris, before which his paper was read, was that normal ovariectomy, while permissible should rarely be performed and that ample time should be given to the patient before resorting to the radical operation.

The late Prof. Schroeder, while believing that the removal of the normal ovaries may sometimes be followed by the cessation of various hysterical or convulsive attacks, or of mental disorders, is very cautious in his anticipations as to the permanence of the recovery, and he relates some cases where the results were more than



doubtful. The first operation was in April, 1878. In August, 1880, the report was that, so far as sexual appetite was concerned the woman was "completely dead," and there was so much vaginismus she could not suffer coitus. The second case was operated on in January, 1880. In November, 1881, there was a return of cramps, etc. With regard to these cases, Schroeder remarked that, "in contradiction to Lawson Tait's theory, I have twice performed castration, removing the ovaries only and leaving the tubes, yet in both patients the menses were permanently stopped." The third patient was operated on in October, 1881, and although the report was generally satisfactory, she went to Marienbad in the summer of 1886, on account of fainting fits and incontinence of urine. The fourth patient, operated on in August, 1881, is reported in May, 1882, as suffering every four weeks, without any appearance of menstruation, from abdominal pain, flatulence, epistaxis alternating with bleeding from the anus, and once with bloody urine. This was followed by a variety of nervous symptoms leading to morphinism and coccygodynia, for which the coccyx was removed, and partial incontinence of urine, for which several operations on the urethra were performed. We must add, however, that according to the experience of other operators, these results rarely, if ever, follow removal of the uterine appendages.

A leader in the British Medical Journal makes the following pertinent remarks about Battey's operation:—

Clinical experience has demonstrated a useful and legitimate field for the operation. Not to dwell upon cases still under trial, such as some extreme cases of dysmenorrhœa, of metrorrhagia, and of nervous disorders in which other treatment has failed and in which clinical analysis points to the ovaries as the source of the mischief, in certain cases of growing myoma of the uterus, which do not develop in such a way as to admit of removal, the ablation of the ovaries will arrest growth and save the patient. No one familiar with the history of these growths will dispute the fact that their progress is often, through terrible distress, to more or less speedy death. Battey contends, in accordance with the all but unanimous opinion of physiologists, that the ovaries are the *primum mobile* of uterine function and growth. Myoma, or uterine tissue in perverted excess, like the normal tissues is stimulated by ovarian action. Take away the ovaries, and the growth ceases: premature climac-

teric is induced. As to the relative influence of the ovaries and tubes in the function of menstruation, the prevalent doctrine is that the ovaries are the instigators of menstruation. Mr. Lawson Tait, daring the charge of physiological heresy, affirms that ovulation is not the efficient cause of menstruation, and that the Fallopian tubes, being strictly a part of the uterus, are of more pathological importance. So Battey removes the ovaries; Tait removes the tubes, but he takes the ovaries along with them. Certainly the tubes, regarded as conduits, are of no use if they have nothing to carry. Tait has yet to prove this part of his case; but this does not weaken the great clinical basis upon which his conclusions and his remarkable results rest."

Another leader<sup>53</sup> states of Tait's operation, that "since the recognition by the profession of Tait as the author of an operation which consists of the removal of the ovary (normal) and Fallopian tube, on account of disease of the latter, either with or without the surrounding tissue and organs being involved, we have thought injustice done Dr. Battey. It was not long after Battey had successfully performed his operation and published the same to the world, that Tait entered the arena and claimed the entire procedure as original with himself. Battey had but little trouble, however, in establishing his claim as the author of the idea of removing the ovaries for the purpose of precipitating the menopause, and thereby of arresting certain conditions not amenable to other treatment.—desperate cases of dysmenorrhœa, morbid growths, etc. While he had not developed the entire resources of his operation he had proven its practicability and great safety. This operation may not have been known to Mr. Tait, as he published his experience not long after Battey's was given to the world. The procedure now denominated Tait's operation is not essential to the cure of any of those pathological conditions for which it was instituted, save perhaps pyosalpinx; for any other condition in which it might be indicated the Battey method would answer quite as well. The removal of the ovaries would, by arresting the periodical congestion, terminate the inflammation in the tubes and surrounding connective tissue, however chronic the tendency might have proven. The difference, therefore, is not very great, even though based upon the pathology for the removal of which the proceeding is instituted. Be this as it may, it was certainly very

unfortunate that Battey's operation ever came to be regarded as one simply of the removal of normal ovaries. The idea was suggested no doubt because of the desire to make a distinction between it and what was then as now known as ovariectomy, consisting in the removal of the ovaries or parts thereof largely involved in pathological change."

Since Battey first performed his operation the profession has made great advances in the diagnosis of pelvic disease. Up to the time of Nonat and Bernutz in the study of pelvic cellulitis, or "peri-uterine phlegmon" of Nonat, pelvi-peritonitis of Bernutz; and later on, of para-metritis and peri-metritis of Duncan and Virchow, of lymphangitis of Cruveilhier and Tilt, covering a large period of gynecological research, but slow progress was made. The recognition of salpingitis and pyosalpinx, etc., or a definite understanding of the relationship existing between cellulitis, peritonitis and inflammation of the tubes, was the natural outgrowth of such well directed investigation, and of abdominal surgery. Of the latter, Battey's operation shed the most direct rays, and from them were drawn the first great lessons regarding the surgical necessities of this circumscribed region.

Thomas Savage<sup>54</sup> contends that the removal of the normal ovaries may be justified, in a very few instances of deformity, in which the birth of a living child is impossible, or might reasonably be expected to prove fatal to the mother. He also advocates their removal in some cases of uterine myoma threatening life. Usually, however, in myoma the ovaries are diseased and not in a normal condition.

In a discussion on a paper read by Lawson Tait, on the "Results of Unilateral Removal of the Uterine Appendages," the conclusion was reached that if a woman's sufferings were sufficient to justify abdominal section for chronic disease of the appendages, and only one side was found to be affected, the operation, to be of lasting benefit to the patient, should be bilateral. Van der Veer, of Albany, stated that he was deeply impressed with the fact that many so-called nervous patients subjected to operation could be relieved by medication. T. Addis Emmett and Wylie deprecated the too great frequency of this operation.<sup>55</sup> Dr. Mundé, of New York, also makes a strong plea in favor of leaving the not markedly altered organ. Mr. Lawson Tait has reported 26 unilateral cases of oöphorectomy of his own, with absolute failure in 13 cases.

Dr. N. V. Jastreboff,<sup>56</sup> of Warsaw, thinks that when the woman is in the child-bearing period and the remaining ovary perfectly healthy, to leave it intact is to intentionally retain the "possibility of conception and pregnancy," that is, that the woman as a productrix has been preserved. Dr. Howard A. Kelly,<sup>57</sup> of Philadelphia, says that the removal of both ovaries is a question which has been discussed in terms of vague generalization and sentimentality, and that there are facts in Sir Spencer Wells' table which determine the question upon a solid basis. In Wells' 1000 cases, there were 351 women survivors with one ovary and in a child-bearing condition. As an actual fact, 117, or about one-third, did bear children to the number of 228, or a fertility of about 65 per cent. in the total number of survivors. This is clearly the advantage of leaving one ovary. The disadvantages are obviously a return of the tumor in the other ovary and death from the second operation. In 7 of these 351 cases, a second operation was necessary, and one of the 7 died of a tumor, doubtfully uterine. Here then is the status of the "one ovary" case: one doubtful death of a woman seven years after the first operation against 228 children born.

Dr. Kelly considers oöphorectomy a well defined operation in certain cases of subinvolution and chronic metritis, especially where there is exacerbation of all symptoms at the menstrual period.

*Treatment.*—Dr. John Thomas,<sup>58</sup> in relating his experience in 384 laparatomies, says that he does not use a clamp on the pedicle and seldom a ligature, but is satisfied with the actual cautery, which he considers sufficient, when properly used, in almost all cases. His objection to the silk ligature is that it is not always absorbed or encysted. He mentions one case in which a silk ligature escaped two years after it was fastened to a pedicle, and the knot and ends of silk were perfect. In another case six knots came away during two years. He had had occasion to make post-mortem examination a number of years after the operation in a good many cases and had found no ligature remaining, only little pigmented spots at their sites, and not even puckering of tissues in the vicinity.

Lawson Tait<sup>59</sup> emphasizes the advantage of washing the peritoneal cavity instead of sponging. For example, in ovarian

tumors with colloid contents too thick to run through the tube of a trocar, and too thin or gluey to be removed with the fingers or sponge, he substitutes a stream of lukewarm water siphoned from a reservoir which melts down this gelatinous material and promptly removes it; also in case blood clots or the purulent and flocculent effusions met with in tubercular peritonitis have to be removed, a stream of water is made to travel over every portion of the peritoneal cavity wherever it may be thought necessary. The soiled intestines, in order to be thoroughly cleansed, must be gently moved about by the fingers. The water used should be of a temperature which the operator's hand can bear with comfort. Very hot water is sometimes useful in arresting small bleeding points. In this case a stream of water of a temperature of 120° F. may be directed into the pelvis for a few seconds. The author believes that the effect of rough sponges on the inflamed peritoneum is injurious.

*After-Treatment.*—There has been lately a decided lessening in the use of opium, and the patients certainly, in the majority of cases, get on better without any, although it is sometimes necessary to give a small amount for a short time after the operation in order to prevent any subsequent shock. In cases of peritonitis with free suppuration, the bowels should be moved by saline cathartics with but a small quantity of water to induce osmosis, but in those cases in which the suppuration is but slight, the better therapeutics seems to be to use opium.

Frederick Treves,<sup>60</sup> Surgeon to the London Hospital, never allows his patients to wear a belt after abdominal section, except when the abdominal wall is already much weakened by being pendulous and loaded with fat. Ventral hernia is due to weakening of the abdominal parietes, and as that wall is composed of muscular and aponeurotic tissues, its strength will depend upon the state of muscular development. Muscle can only be strengthened by use. If a belt is worn, the responsibility of supporting the viscera is thrown, not upon the muscles, but the instrument. Mr. Treves believes that the secret of success in preventing ventral hernia is not to allow the patient to get up too soon. A month in bed is not an unreasonable time.

Dr. Rabagliati<sup>61</sup> calls our attention to the temperature which generally occurs in a perfectly normal case following operation.

For the first few hours after the operation the temperature is subnormal, which is due to shock; then there is a reaction with a temperature slightly above the normal; the third stage, technically known as the stage of convalescence, is characterized as a rule by a subnormal temperature, which has not, in Dr. Rabagliati's opinion, obtained the attention from medical men that it deserves. These successive stages do not appear, in his opinion, by accident, but seem to be the expression of a fundamental law, that the departure of any organized body from its natural condition tends to be followed by its opposite.

*Complications.*—Küstner,<sup>62</sup> of Jena, contrasts the difficulties attending the removal of small ovarian tumors with those accompanying the removal of larger ones. It is more difficult to find the linea alba since the recti muscles are not separated. The incision of the supra-peritoneal fat and the opening of the peritoneum is easier when the walls are stretched by a large tumor underneath; and in the smaller tumors the intestine is more liable to escape from the wound, obstructing the incision, and its replacement is often difficult and dangerous. The hyperæmia which occurs in the prolapsed intestines may lead to dysentery. The small size of the incision and the shortness of the pedicle in the small tumors also increases the difficulties of manipulation. Notwithstanding, Küstner prefers to operate as soon as the tumor is recognized, for although it may not be carcinomatous or sarcomatous, still, its removal may prevent a benign growth from becoming malignant.

Dr. Hector C. Cameron<sup>63</sup> has called attention to an unusual form of adhesion which he met with during ovariectomy, passing from the small intestine to the cyst wall and evenly continuous with the bowel. On manipulation between the thumb and forefinger two surfaces were discovered sliding over one another; and the introduction of flatus from the gut inflated it from one end to the other. Dr. Cameron's rationale of the production of this diverticulum is that the bowel had been cemented to the cyst wall and by dragging and pulling had been drawn out into this tubular adhesion.

Terrillon<sup>64</sup> has met with several examples of torsion of the pedicle, which occurs in about 6 per cent. of ovarian cysts, and is caused by repeated medical examination, by pregnancy, by the

friction of a cyst of the other ovary or of a uterine fibroid, and by the filling and emptying of the bladder and rectum. Sometimes the pedicle is twisted off and the cyst remains free in the abdominal cavity as observed by Kidd and Rokitansky. Sometimes it becomes attached to other organs, more especially to the omentum, from which it then gets its bloody supply. More frequently the cyst inflames, causing a general peritonitis and many adhesions, or it becomes gangrenous. The fluid contents usually contain more or less of altered blood, of a chocolate color. As soon as grave symptoms set in, which are those of peritonitis, the radical operation should be performed. The prognosis is good, for out of 62 cases collected by Terrillon only 12 died. Valat and Reboul<sup>65</sup> report a case of acute torsion which presented the usual symptoms of pain, vomiting and high temperature. Extensive parietal adhesions were found and the fluid was dark and bloody. Chalot, in an elaborate article on transplanted ovarian cysts, caused probably by twisting and consequent sloughing off of the pedicle, gives a list of 14 cases accidentally discovered in the dissecting room, and 13 cases in which an operation revealed the condition of transplantation. In only one of the former was the death due to the tumor. In the latter the tumors kept on growing, although wholly detached from the oviduct and round ligament. In 15 of these cases the attachment was omental and unusually broad, but sometimes it was as slender as a pedicle. In the other cases the adhesions were general. Twice the tumor was found wholly free and lying in the recto-vaginal fossa. While the majority of these cysts were multilocular, the proportion of dermoid cysts was a very large one.

According to Fenwick,<sup>66</sup> the immediate symptoms of twisted pedicle are syncope, or even collapse. If these are absent, the patient almost always suffers from a smart attack of peritonitis. R. Barnes has always observed local and constitutional symptoms of suffering, and that in some cases gangrene of the tumor followed.

Le Bec<sup>67</sup> relates the history of a case of intra-ligamentary cyst with extensive adhesions. After its removal, the operator discovered another cyst in front of the right kidney and directly under the liver. Supposing it to be a renal cyst, he let it alone and closed up the abdominal wound. As the cyst began to enlarge rapidly during the convalescence of the patient, he decided, five

weeks later, to remove it. After making the usual lumbar incision, he discovered, to his surprise, that the kidney was sound, and that the cyst was ovarian, but attached to the renal peritoneal coat. By enlarging the lumbar incision, he was enabled to introduce his hand, break up these adhesions, tap the cyst and remove it. The woman recovered.

Treves<sup>68</sup> successfully removed the kidney with both ovaries. The former organ had degenerated into a hydronephrotic cyst. The ovaries were both cystic.

Terrier<sup>69</sup> had a case of cyst of the right ovary, together with a sarcoma of the colon. The cyst was removed, and at the same time as much as possible of the sarcoma. The question of excision of the colon came up, but was rejected. He now thinks, however, that it should have been done, had he been prepared for such a contingency. The patient lived twenty-two months afterward, dying from the malignant growth.

*Sequele.*—Levison, of Copenhagen, Corresponding Editor of the ANNUAL, reports a case of remarkably high temperature after an ovariectomy performed by Koefoed<sup>70</sup> in a woman 63 years old. Thirty-six hours after the operation, the temperature rose rapidly until it reached 109.4. The woman became unconscious and had a pulse of 136 and a shallow and irregular respiration. The dressing was removed and the incision covered with a layer of collodion in which iodoform had been dissolved. Ice was then applied to the abdomen and to the head. In one hour the temperature was reduced to 104, and after 24 hours, to 100.6, when the woman became conscious. The improvement continued for 8 days, when the patient died from an attack of acute pneumonia of the right side. Not a single trace of peritonitis was found at the autopsy.

Dr. Jas. B. Hunter,<sup>71</sup> of New York, speaks of the persistent pain after abdominal section, and says that the one prominent symptom which determines operation is the constant or periodical pain in many doubtful cases of disease of the ovaries or tubes. If that pain is not permanently relieved, the operation, as far as the patient is concerned, is unsuccessful. Dr. Hunter ascribes the pain in these cases to three conditions: (1) A former peritonitis with the presence of adhesions; (2) Peritonitis, however slight, following the operations with firm adhesions, causing pain by preventing the



normal mobility of the pelvic viscera, by pressure on nerves, by interfering with the circulation and sometimes by constricting the intestines and interfering with their calibre. Pain may result from some defect in the abdominal wound permitting the occurrence of ventral hernia. Pain in the cicatrix may occur here as elsewhere, and abscesses in the region of the wound may be the occasion of a great deal of suffering.

W. Goodell<sup>72</sup> first called the attention of the profession to parotitis following ovariectomy. It is sometimes suppurative, but oftener partakes of the character of mumps and then does not seem to endanger the life of the patient. Numerous other cases have been collected by Stephen Paget<sup>73</sup> and others.<sup>74</sup> Von Preuschen<sup>75</sup> also reports a case which recovered without suppuration. This affection is plainly not mumps, but is a metastasis or sympathy, due to the well known relationship between the parotid glands and the ovaries. Joal<sup>76</sup> reports such a case, and Goodell has met with another one. Reid<sup>77</sup> met with parotitis in a case of fibroid polypus of womb with foetid discharge. The glands began to swell on the tenth day after the operation and the patient died in two weeks from starvation. Harkin<sup>78</sup> had a patient who had six attacks of parotitis in as many successive pregnancies.

Bumm<sup>79</sup> has collected 17 cases of parotitis after ovariectomy. He cannot explain it as a mere coincidence, nor yet can he attribute it to pyæmia. Referring to the well known relation between the sexual organs and the parotid glands, he is disposed to think that nervous pathways exist between both, which permit a reciprocal transference of irritation. In this way, perhaps, an irritation affecting the ovary, produces a vaso-motor disturbance in the parotid, which increases up to simple inflammation. If, while in this condition, pus-forming bacteria, which are perchance in the mouth, should wander into the salivary glands, the inflammation may result in suppuration. In the sero-purulent secretion of one case, he found the staphylococcus aureus.

A fatal case is reported by Hitchcock,<sup>80</sup> of tetanus after the removal of a sarcoma of the ovary. Meinert<sup>81</sup> also reports a death from the same cause after ovariectomy.

*Menstruation after the Removal of Both Ovaries.*—Terrier<sup>82</sup> reports several such cases, as also does Skene Keith,<sup>83</sup> both attributing them always to some ovarian stroma left behind in the

pedicle. In this opinion they are sustained by Championnière,<sup>84</sup> Koeberle and Puech.<sup>85</sup> But this view is not a tenable one, as many other ovariologists report analogous cases, in which there was no question of the complete removal of the ovaries. In these cases the continuance of menstruation is usually limited to a few months, after which the menopause takes place. Savage<sup>86</sup> and Croom<sup>87</sup> both report analogous cases, in which menstruation continued after the complete removal of the appendages; but they do not attempt to offer any explanation for it.

*Statistics.*—Wylie<sup>88</sup> gives the following summary of his work in abdominal surgery: there were up to January 1, 1887, 74 laparotomies for the removal of the uterine appendages, with 5 deaths, but there were no deaths in the last 27. Since that time he had 36 more with a single death, making the excellent record of 61 consecutive cases without a death. 11 of these cases were for either painful or bleeding fibromata, but in 2 of them menstruation kept on. In bleeding fibroids he warmly advocated curetting and re-curetting the endometrium, and says that this operation rarely fails to stop the bleeding, because this comes mostly from fungosities. But in large tumors, the uterine cavity is too tortuous to be reached by the curette.

In 2 of the 36 cases, the tubes and ovaries being found healthy, were not removed. In a third the adhesions were broken up, and the uterine appendages left behind. The after history of this case was not obtained because, after learning that her ovaries were not removed, she became troublesome and was discharged from the hospital.

Although Wylie is very guarded about the removal of the ovaries for neuroses, yet he has with success operated in "three or four well-marked extreme cases, but it has not changed the delicate woman into a strong, healthy woman; yet they are up and about and are not pulled down on their beds by the periodical return of menstruation." Since January he has also performed 7 supra-pubic hysterectomies, with but a single death. The tumors weighed from 10 to 28 pounds, and the fatal case was complicated with syphilitic pyosalpinx.

Skene Keith<sup>89</sup> reports 23 cases of oöphorectomy without a death. Two were improved, two no better and the rest cured. He attributed the tubal disease not so much to gonorrhœa as to

tears of the cervix and to the indiscriminate and careless use of the uterine sound. He had softening of the hard and enlarged tubes follow an operation on a torn cervix, and the patient was cured.

H. C. Cameron<sup>90</sup> reports 26 cases of complete ovariectomies with 4 deaths; 2 incomplete ovariectomies with one death; and 2 extirpations of cysts not ovarian, with one death. Two of his successful cases had ventral hernia afterwards. He used the drainage-tube in all cases with extensive adhesions, and in those in which fluid had escaped from the cyst into the abdominal cavity. The carbolic spray was used in all but four of the cases.

Terrier<sup>91</sup> reports 25 ovariectomies with 6 deaths. All were performed under strict Listerism, including the spray. Only seven were without adhesions. In five the operation was uncompleted on account of adhesions, and two of them died in a few days. A third lingered on for 13 months and then died. In two cases the abdominal wound burst open on the sixth and seventh day respectively. Both recovered, but one had a large ventral hernia.

Prof. D'Antona,<sup>92</sup> of Naples, has had up to 1885, 48 completed ovariectomies with 7 deaths. He has also had 38 other cases of abdominal section, of which 27 recovered.

W. Goodell<sup>93</sup> has had during the past two years 57 cases of ovariectomy with 5 deaths, or a percentage of 8.7. His best run was 31 cases with but one death.

The following are the records of the longest successful runs of different operators: Tait, with 139 cases; Keith, with 80 cases; Bantock, 50; Skene Keith, 49; Thornton, 40; Homans, 38.<sup>94</sup>

During the year 1886 Tait removed the uterine appendages of 63 patients with but one death. Many of the patients had come to him from long distances and all had been suffering for years.

A year's work in laparotomy by Mundé<sup>96</sup> shows excellent results. 22 were ovariectomies with 5 deaths, 13 were salpingo-oöphorectomies with 1 death; 2 were hysterectomies with no death, 4 were exploratory incisions, all recovering; one each for intra-peritoneal abscess and for intestinal obstruction, in all 45 operations with 8 deaths. Of these deaths 3 occurred in almost hopeless cases. Mundé never refuses to operate where there is the slightest chance of recovery. Of course his statistics suffer thereby,

but he has thus saved several apparently hopeless cases. For instance, in one of his successful cases, another operator had made an exploratory incision and had abandoned the case on account of very formidable adhesions. Three of his successful cases of ovariectomy were operated on while they were pregnant.

#### TUBAL DISEASES.

*Etiology.*—Dr. Martin,<sup>97</sup> of Berlin, has in the past five years carefully studied 287 cases, every precaution being taken against sources of fallacy. Only nine of these cases were under 20 years of age; 16 were between 40 and 50. A large majority were in the active period of sexual life; 220 were married; 67 single, whether virgins or otherwise; 113 had at least never borne children. It is worthy of note that 61 had aborted, once or more frequently; 27 had certainly aborted but once. In almost every case other pelvic organs were affected besides the tubes, more often disease of the endometrium and of the uterus, frequently traces of chronic pelvic peritonitis, adhesions, ovarian inflammation or traces of old pelvic cellulitis were present. Usually the uterus showed signs of chronic metritis and endometritis.

Subinvolution was marked in 70 cases where the disease had followed labor. In 7 cases there was an ovarian tumor, in 4 myoma, in 3 malignant disease of the mucous membrane. In not one case was it distinctly evident that the inflammation had commenced as a salpingitis; it appeared to have spread from neighboring organs. In 147 cases the disease had followed acute or chronic affections of the endometrium; in 70 the salpingitis was due to childbirth; in 55 it was caused by gonorrhœa; in 3 it was traceable to syphilitic infection; in 10 cases the patients were tuberculous; in 122 cases there was a morbid condition of the pelvic peritoneum, ovary and broad ligament.

In 11 cases Dr. Martin was distinctly able to trace the extension of inflammation to the peritoneum and pelvic viscera, but not from the pelvic peritoneum to the Fallopian tubes. In 2 cases only was the extension from the tube to the peritoneum due to a bursting of the tube, in the others being probably caused by the escape of various discharges from the ostium of the tube. In 91 cases the disease was bilateral; in 58 the right only; in 138 the left. Both tubes were affected in more than a quarter of the cases

caused by endometritis, in a quarter of the puerperal cases; in about one-half of the gonorrhœal; and in two-fifths of the tubercular cases.

Dr. Martin,<sup>98</sup> of Berlin, quoted by Mr. Alban Doran, describes three forms of salpingitis: In one form the folds of mucous membrane lining the tubes become swollen, and there is abundant small cell infiltration, whilst the epithelium mostly remains unchanged. The vessels are engorged and there are scattered ecchymoses. This Dr. Martin calls *endosalpingitis* or *salpingitis catarrhalis*.

When the muscular coat is infiltrated in a similar manner, so that the fibres are forced apart, the mucous membrane bulges out of the ostium, the lumen of the tube becomes obstructed, especially toward the uterine extremity and the tube swells up, forming a thick cord. This he terms *salpingitis interstitialis*. The third form which he describes is different from the other two. There is small-celled infiltration, shedding of the epithelium and the formation of involution or pouches in the mucous membrane of the tube.

These pouches penetrate the mucosa and may involve the whole wall of the tube, which becomes enlarged and tortuous. Under the microscope the substance of the tube will be found riddled with gland-like follicular cavities, mostly lined with a single layer of cylindrical epithelium. The blood-vessels surrounding these cavities are partly engorged, partly compressed and empty. As in the other forms, the nature of the contents of the tubes is variable. This variety Dr. Martin terms *salpingitis follicularis*.

In follicular salpingitis the fact that the thickening of the muscular coat by the infiltration and invasion of the folliculæ forces apart the peritoneal investment of the tube, Mr. Alban Doran thinks may explain how the tube, in some forms of tubo-ovarian cyst due to perimetritis is found closely applied to the surface of the ovarian cyst, as in the case of a broad ligament cyst, which pushes aside the layers of the broad ligament till it touches the tube.

In a discussion at the Harveian Society of London, Mr. Alban Doran<sup>99</sup> said that in the too common disease of the uterine appendages, the true pathological condition was pelvic peritonitis (perimetritis), which caused the ovary, tube and broad ligament, and sometimes the intestines, to be soldered into a single mass, and that these adhesions gave rise to three-fourths of the mischief

attendant upon the disease. He said that this explains the marked relief following an operation in which the surgeon has merely broken down the adhesions by handling them, without removing the appendages. Thus it is that hopelessly diseased ovaries and tubes should be removed and the intestinal adhesion carefully broken down with the object of giving permanent relief. He believed that oöphorectomy was perilous and unsurgical when pelvic cellulitis (parametritis) existed, as well as the perimetritic disease of the appendages, for the worst part of the diseased structures were left behind in the pelvis after it had been severely irritated by the surgical operation.

*Causation.*—Recently, at the Edinburgh Medico-Chirurgical Society, Mr. Skene Keith<sup>100</sup> expressed the opinion that the most frequent cause of disease in these organs is laceration of the cervix; and if greater attention were paid to the primary lesions there would be less necessity for operative interference later. He does not think that gonorrhœa is as frequent a cause as it is supposed to be.

Dr. M. Saenger,<sup>101</sup> of Leipsic, divides the different kinds of salpingitis into three groups, depending on their etiology: Group 1. Forms of salpingitis produced by known specific microbes such as (1) salpingitis gonorrhœica caused by the gonococcus of Neisser, which remains invariably a disease of the mucous and serous surfaces, and is never followed by destructive suppuration of the uterine appendages. Dr. Saenger does not believe that the gonorrhœal pus ever penetrates the walls of the tubes and thus produces disease, but that it causes a non-specific inflammation of the whole tubal wall. (2) Salpingitis tuberculosa, produced by the bacillus tuberculosus of Koch. The pus in a case of purulent salpingitis may of course undergo caseation, which condition is termed coagulation necrosis by Cohnheim-Weigert. Dr. Saenger wishes it to be distinctly understood that tuberculous salpingitis will never result therefrom unless there be added a tuberculous affection. (3) Salpingitis actinomycotica, produced by the actinomyces bovis of Böllinger. In support of this division, Saenger quotes the case of Adolph Zemann,<sup>102</sup> in which the tubes were dilated and filled with pus and clumps of actinomyces. The fungus had migrated either from the vagina or intestines, which were found extensively adherent to the tubes.

Group 2. Forms of salpingitis due to specific microbes identical with those producing traumatic infection. This division embraces salpingitis septica (pyemica, ichorosa, purulenta, diphtheritica). As Dr. Saenger says, the term salpingitis septica is rather general and inaccurate, as when speaking of a pyosalpinx, we simply mean that the tube contains pus; when employing the term salpingitis septica, we merely indicate that the infection is due to a specific microbe.

Group 3. Forms of infectious salpingitis produced by specific, but as yet unknown, microbes. Under this heading, he places salpingitis syphilitica. This disease has been described by Bouchard and Lépine,<sup>103</sup> who say that the pathological changes in the tubes are similar to the changes caused by syphilis in other organs. Saenger has never seen a case of tubal syphilitis, but has no reason to doubt the existence of this disease. Under this group he also includes those peculiar inflammations of the uterine appendages in young subjects the origin of which—gonorrhœal, tubercular or traumatic, as from inflammation of neighboring organs, typhlitis, dysentery and perhaps helminthic diseases—is unknown. It has been long known that certain infectious diseases such as typhoid fever, scarlatina, variola, or cholera, may invade the genital organs. It is quite probable that the local affection is caused by the same specific microbes which produce the constitutional disease, but this remains to be proven.

Cases of tubercular salpingitis are now so frequently met with that there is no doubt of its existence. It is usually primary, local, and not dependent necessarily upon a general tuberculous condition, or on tuberculous degeneration of other organs. Interesting cases are reported by Kotschau,<sup>104</sup> Gehle,<sup>105</sup> Hegar,<sup>106</sup> Münster-Orthmann,<sup>107</sup> Schramm,<sup>108</sup> Wiedon,<sup>109</sup> Winckel,<sup>110</sup> and Jeannel.<sup>111</sup> Münster and Orthmann<sup>112</sup> report a case in a chlorotic woman aged 24, and married three years without conceiving. She had a painful tumor in each groin, but no other symptoms whatever, not even painful menstruation. During the operation, numerous adhesions had to be severed and the appendix vermiformis was severed. The patient recovered in five weeks, her convalescence being delayed by an exudate in right groin. The tubes, respectively as large as the fist and an apple, were filled with a thick pus containing the characteristic bacilli. Tubercles

were found upon the peritoneal surface of the tubes as well as in their cavity. The right ovary had undergone follicular degeneration, but the left ovary being healthy, was not removed.

Dr. Arthur H. N. Lewers,<sup>113</sup> in an examination of a series of 103 cases in the post-mortem room of the London Hospital, found 17 per cent. with disease of the Fallopian tubes, restricting the expression to pyosalpinx, hæmatosalpinx and hydrosalpinx. Dr. Galabin thought the percentage rather large and referred to 302 necropsies at Guy's Hospital with only 12 cases of distension of the tubes, 2 of these being very trivial.

*Symptoms of Salpingitis.*—According to Dr. Ecklund, Corresponding Editor of the ANNUAL, the symptoms are a continuous pain in the lower pelvis, which is augmented at every menstrual period, and pains somewhat spasmodic in character. These he attributes to contraction of the tubal wall, which has become over distended by the entrance of menstrual fluid. The continuous pain he refers to a perimetritis, which he tries to subdue before an operation.

During the session of the American Gynecological Society, Dr. W. M. Polk,<sup>114</sup> of New York, read a paper with the title, "Are the tubes and ovaries to be sacrificed in all cases of salpingitis?" By the term salpingitis, he meant that disease formerly known as pelvic cellulitis, and characterized by inflammation of the planes of cellular tissue belonging to the uterus and its appendages. According to its behavior it had been called acute, chronic and recurrent cellulitis and peritonitis. The most constant change produced was the dislocation and imprisonment of the tubes by adhesions, the ostia were frequently closed, and probably the parenchymatous changes in the walls of the tubes were in part the result of the adhesions. The ovaries were also involved as the result of the inflammation and by being bound down were deprived of that freedom of movement and ability to expand which were essential to the normal performance of their functions. The mobility of the uterus was also impaired. Dr. Polk concluded that for the purposes of procreation, there was no utility in leaving the occluded tube in position; but to satisfy the patient's desire to escape mutilation, excepting to save life or restore health, the ovaries and tubes should not be touched.

The discussion was continued by Drs. A. Martin, of Berlin,



T. Addis Emmet, of New York, William Goodell, of Philadelphia, and G. C. Bantock, of London, who would unhesitatingly answer in the negative the question of Dr. Polk.

Dr. Chas. A. L. Reed<sup>115</sup> says a woman with double pyosalpinx cannot become pregnant, on account of the following conditions: (1) Occlusion of the distal ends of the tubes, in consequence of adhesions of the fimbriæ; (2) obstruction of the uterine orifice of the tube from desquamative changes in the lining epithelium,—conditions which prevent the migration of either sperm or germ; and (3) the presence in the tubes of the products of suppuration,—a condition incompatible with the vitality of either sperm or germ. In the case of unilateral pyosalpinx, impregnation becomes dangerous because the distension of the tube incident to the evolution of the uterus, may result in rupture internally and death; or, in absence of so serious a result, abortion may be caused, with serious complications. Dr. Reed mentions a case of this kind in which the woman was saved only by rigid antiseptic irrigations of the uterus.

Dr. J. M. Baldy,<sup>116</sup> of Philadelphia, operated on a case of pyosalpinx in a patient with puerperal fever. The case was also interesting from the fact that it was directly traceable to gonorrhœa, and had apparently been in progress for some time. That pregnancy may take place with a one-sided pyosalpinx seems probable from a history of the case.

*Diagnosis.*—To show the difficulty of diagnosis in some cases, Dr. Kennedy<sup>117</sup> reports the case of a young married woman who, after her first pregnancy, contracted gonorrhœa from her husband. This was followed by pelvic troubles. She had incessant pelvic and abdominal pain, increasing at each menstrual period and during intercourse. Dr. Kennedy performed salpingo-oöphorectomy, and found to his surprise that there was no pus, but that the tubes were distended with serous fluid.

*Prognosis.*—Dr. Martin,<sup>118</sup> of Berlin, finds that the simple forms of salpingitis get well by rest and appropriate treatment. When the inflammation is caused by septic influences, the prognosis is less favorable. The inaccessibility of the affected part is the bar to treatment.

Terrillon<sup>119</sup> communicated to the Paris Academy of Medicine the histories of four cases of oöphorectomy. The first case had an abundant metrorrhagia, with great pain and nausea. Both ovi-

ducts were much enlarged and filled with blood and clots. The second one also had metrorrhagia, and gushes of a dirty liquid from the uterine cavity near the time of menstruation. Her nausea was extreme, demanding a liquid diet for two years. One oviduct was found full of blood. In the third one, in which hæmorrhage was due to a fibroid, the tubes were also distended with blood. In the fourth, the ovaries were diseased, and the tubes contained muco-pus. In all, the ovaries were implicated by adhesions; in three the disease started from puerperal inflammation. All the operations were successful.

Gusserow<sup>120</sup> has extirpated 14 pus cysts of the oviducts. All cases presented peri-uterine lesions, and all recovered. In his opinion, this disease is largely due to gonorrhœal infection. A marked symptom is menorrhagia, which comes from the distended tube. From the fact that, in many of these cases, the cyst burst during the operation, and pus escaped freely into the peritoneal cavity without developing any bad symptoms, he believes that the danger from spontaneous rupture is greatly overrated.

Meinert<sup>121</sup> has performed 15 salpingotomies with one death. There were 7 cases of pyosalpinx, 7 of hydrosalpinx, and 1 of tubal pregnancy. The majority of these cases started from gonorrhœa. The sole death was caused by tetanus.

Dr. F. Westermarck<sup>122</sup> gives an interesting résumé of a case of salpingitis operated on in 1886 by Dr. F. Ecklund at the Sabbatsberg Hospital at Stockholm. He places in the first rank as an indication for the operation tubal pregnancy, before rupture if diagnosticated, and always after rupture unless the woman is *in extremis*. He is opposed to the various methods resorted to for arresting tubal pregnancy, as he deems them more dangerous than the radical operation, which he has performed once and successfully. Of such operations he is cognizant of thirty cases, of which all recovered but two. He warmly advocates the removal of the tubes for pyo- and hydro-salpingitis; but thinks that haste should not be made as the diagnosis is not a positive one, and the patient may merely have an exudation from which she may recover. Out of his whole ten operations he lost one patient who had secondary tubercular salpingitis. Out of 498 oöphorectomies performed by eight operators, he finds 41 deaths, giving a fatal percentage of 8.2 per cent.

## TUBAL PREGNANCY.

Mr. Lawson Tait,<sup>123</sup> in an able brochure entitled, "Twelve Cases of Ruptured Tubal Pregnancy," makes the following statements:—

"All the points of my previous papers on this subject are confirmed by the facts of these twelve cases. The diagnosis is not always possible, but it may be made correctly in probably eighty-five per cent. of the cases. The real clue to the nature of the case is a history of sterility for some considerable time, the arrest of menstruation for weeks or even months, a sudden access of pain and collapse, with repetitions of these attacks, as graphically described by Dr. Dolan in his communication concerning his own case. The operation is simplicity itself. Open the abdomen, go at once to the seat of the rupture, that is, the broad ligament, and tie it, for, until you come to absolutely the ligament itself, the tissue is always so rotten and friable that no attempt to arrest hæmorrhage in any other way can succeed. Then clear out the *débris*, put in a drainage-tube. Of course, amputation of the ligatured mass is a matter of necessity. No one would ever dream of leaving such a thing to putrefy in the abdomen.

"Speaking of the treatment of these cases one is obliged to allude to the scheme by which it is proposed to destroy the life of the fœtus, and to arrest the growth of the ovum. All I can say is that I am never called into these cases until the discussion of a proposal of that kind is too late, for being engaged exclusively in special practice I have no opportunity of seeing these cases, and never have seen them until the period of rupture. We have then no concern with the fœtus at all, we have to deal with bleeding from the placental structures and from the maternal sinuses in connection with it. An electrolytic needle under such circumstances would have no more effect than a pinch of snuff. In one of the preparations now laid before you, we have abundant evidence of the fœtus having been dead for weeks, and yet hæmorrhage had been going on. The probability is that that fœtus had been dead for ten weeks before the operation was performed, and yet bleeding had been going on on the morning of the operation. If the cases were seen and diagnosed, as I have already publicly expressed my doubt they could be before the

period of rupture, the introduction of an electrolytic needle, if it happened to pierce the body of the fœtus, might kill it; but would it kill the placenta, which, as we know in the majority of instances, appears to go on growing when the fœtus is dead? There can be no question that in these cases it goes on growing after the fœtus is dead. But whether this be the case or not, the propriety of destroying the child before the period of rupture, if its presence in this abnormal condition can be recognized, I leave to the discussion of the physicians who see these cases before the period of rupture. When the period of rupture, however, has been reached and hæmorrhage is going on, there is nothing, so far as I can see, but for us to follow the surgical rule to cut down and tie the bleeding point.

“That I should be able to produce within the short period of seven years thirty-five cases of this condition, treated by operation, confirms completely the statement of Dr. Blundell, that it is by no means uncommon. That it has been, when left alone, almost uniformly fatal, is a view which he strongly maintains, and which all evidence confirms. In fact there is a paragraph in Dr. Blundell’s writings which sums up all that was known, and all that is known now, save in the matter of operative details, concerning the frequency and cause of this peculiar displacement. ‘I have never seen any cases of tubular pregnancy in which the tube was of great size. More generally this canal enlarges to about the size of a small fist; sometimes to the size of a pullet’s egg only; and in the early part of gestation (say in the second or third month) this cyst bursting open, the child escapes into the peritoneal sac, and the woman suddenly perishes by an internal hæmorrhage. Many women, I have little doubt, die in this way; but, being buried without examination, the real cause of their death is never ascertained. Three or four tubal gestations of this kind have taken place within the circle of my own obstetric acquaintance; whence I infer that the disease is by no means rare.’

“Thanks to the progressive emancipation of the professional mind from the thralldom of authority within the last ten years, we have now the means, if we have a reasonable time in which to act, to save at least the great majority of these cases.

“As I have already said in communications to the Pathological

Society, I do not think it possible to overestimate the value of the recent contribution of Dr. Berry Hart and Mr. J. T. Carter on the results of the examination of frozen sections of two cadavera in which advanced uterine gestation was observed.

“The views which I advanced concerning the pathology of extrauterine pregnancy, so long ago as 1873, have been entirely confirmed by facts that I have since seen in the operative details of this condition. But the misfortune of the operation is that it is witnessed by few people, and in such cases as those in which the operation is performed at the time of early rupture, the details are not perceptible to any one except the operator. It became therefore, a matter of the utmost difficulty to persuade my professional brethren of the accuracy of my views, and, except that they were always alluded to in writings on the subject, seemed to make very little impression. Dr. Berry Hart’s observations have completely proved the accuracy of the views which I had about this peculiar displacement.

“Briefly stated, what I regard as the true pathology of extrauterine pregnancy is as follows :—

“In the first place, one or both, generally both, of the Fallopian tubes are so damaged by inflammatory change—desquamative salpingitis—that the procreative machinery is put out of gear. My belief is that the chief function of the cilia of the Fallopian tubes is to prevent the access of spermatozoa, and that, therefore, impregnation takes place in the tube only when deprived of their cilia. Adhesion of the impregnated ovum then takes place to the wall of the tube instead of to the wall of the uterus, and then the ovum develops until the tube can no longer expand. Between the tenth and thirteenth week the tube gives way, and upon the position of the point at which the rupture takes place depends the variety of extra-uterine pregnancy, which is developed. By far the most common seat of rupture is out through the surface of the tube into the cavity of the peritoneum. Because the proportion of the circumference of the tube, which is covered by peritoneum is very much greater than the proportion of the circumference of the tube which is related to what is called the cavity of the broad ligament. This rupture into the peritoneum, so far as we can tell, is fatal in an enormous number of instances; what the proportion is we cannot say, but it looks to me as if it were ninety or ninety-five

per cent. Enormous sinuses are developed in the tube and in the mass of the placenta, these are torn, they bleed, the hæmorrhage is recurrent, and the patients die of hæmorrhage into the cavity of the peritoneum, forming the variety of intra-peritoneal hæmatocele, or they die later on of purulent peritonitis.

“No doubt some of the cases must end in the death of the ovum without much hæmorrhage, and become absorbed, but it is perfectly clear that in these cases the tube will remain functionally useless, because it has been sealed probably at both ends by inflammatory disturbance, and therefore will be a perfectly useless organ. So far as we know, in the whole realm of surgical literature there is only one case in which there is the least evidence of what may be called an abdominal pregnancy going to the full time, that being Mr. Jessop’s case; and even that is open to the view that it would have been one of the other variety, in which the walls of the ovum cavity and the posterior layer of the broad ligament, ruptured just at the last moment, and the child was found in the cavity of the abdomen. At any rate, except this case, there is no evidence at all of any case in which the ovum has been, or the child has been, developed inside the peritoneal cavity. In fact, considering the harmoniously active digestive powers of the peritoneum, the likelihood of the occurrence of such an incident would be very small.

“The second form of rupture, into the cavity of the broad ligament, on the contrary, forms a condition which is, so far as I know, never fatal, or only rarely so, one instance alone having been placed on record in which death had taken place from the hæmorrhage. In that case the fatal issue was doubtless due to the rupture of the cyst into the cavity of the peritoneum, so that really the exception is an example of the rule being proved. Doubtless in many of the cases of this variety the ovum dies at once, or is absorbed like an ordinary broad ligament hæmatocele. But in other cases the ovum does not die, but goes on developing to the full time, death, however, occasionally interfering with the progress of the pregnancy at the fourth, fifth, or sixth month. Then we have the group of cases in which, after suppuration has taken place, the bones of the fœtus are discharged through the rectum, through the bladder, or through Douglas’ *cul-de-sac*, into the vagina. Many instances of this have occurred in my practice, as

also have cases in which a lithopædion is the result. Such a lithopædion probably would have resulted in Dr. Berry Hart's first case.

"The minority proceed to the full time, and are removed either as living or as dead children. Examples of both I have published at the full time. They are removed from a cavity which Dr. Berry Hart proves completely to be extra-peritoneal.

"This last view was what I based all my conclusions upon, that these full time extra-uterine pregnancies were entirely extra-peritoneal; the only place in which they could be was the cavity of the broad ligament, and, therefore, I concluded that they were due to a rupture from the Fallopian tube into the cavity of this structure. Dr. Berry Hart's two preparations absolutely establish the justice of this conclusion.

"One remarkable thing about Dr. Berry Hart's section is worthy of notice, because it explains completely the only difficulty which I found in the whole thing. That is, that whilst the peritoneum is lifted right off the pelvis, all round the organs contained in it in every direction but one, it is not lifted from the anterior surface of the uterus. We have, therefore, a prolongation, like the finger of a glove, of peritoneum curving down in front of the tumor; although reaching as far as the fundus of the uterus into the base of the bladder, on either side of this it is completely lifted. This explains what puzzled me greatly in two instances of my operations, that opening in the middle line. I had to close the cavity of the peritoneum after having passed through both its anterior and posterior layers.

"These observations of Dr. Berry Hart, as I have already said, completely establish my view of the pathology of extra-uterine pregnancy, and these views of themselves enormously simplify at once the pathology and surgery of the condition."

#### CATHETERIZATION OF THE FALLOPIAN TUBE.

Dr. Alfred Gönner,<sup>124</sup> of Basle, describes two cases of great interest. In removing some retained placental tissue from the uterus of a young woman who had aborted three months previously, he was able to pass his curette, with the greatest ease, to the left, for 8 inches beyond the os externum. The instrument was removed, and once more passed in the same direction without difficulty. No bad results followed, and six weeks later involution

of the uterus was found to be complete. About the same time, Dr. Gönner was able to pass the sound 7 inches to the right beyond the os externum, in a young patient a month after delivery. The point of the instrument could be felt entering a cavity. The left tube could not be sounded. On the following day, Dr. Widmer, assistant physician to the gynecological clinic in the University of Basle, without having heard of the results of Dr. Gönner's examination, passed the sound in the same direction nearly 7 inches. A piece of retained placental tissue was removed from the dilated uterine end of the tube. Prof. Birchhoff, who saw the patient, believed that interstitial gestation existed, from the location of a portion of the placenta and the facility with which the sound was introduced into the tube. Dr. Gönner observes that in both cases there was retention of the placental relics, metrorrhaxis and subinvolution following delivery; and as the uterine tissue is soft after labor, he admits the possibility of perforation of the walls of the uterus, but adds that the careful guiding of the instrument from the fundus laterally without any force seems to indicate that it entered the Fallopian tube.

Mr. Alban Doran<sup>125</sup> says that these cases tend to prove that the tubes are unusually patulous for some time after pregnancy and that perhaps this fact explains the frequency of tubal disease and of peritonitis around the tube and ovary after child-birth or abortion, especially when there is gonorrhœal infection. The more patulous the tube, the more likely will it be to admit morbid products from the uterus. It is probable that perforation of the uterus is more frequent than catheterization of the Fallopian tubes, and that the latter can occur only during some physiological process of canalization, such as Dr. Matthews Duncan suggests in the appendix to his clinical lectures.

#### REFERENCES.

1. Cent. f. Gyn. 2. Med. News. 3. Jour. Am. Med. Assoc. 4. Jour. Am. Med. Assoc. 5. Brit. Gyn. Jour. 6. Gaillard, Leçons Clin. sur les Mal. des Ovaires. 7. La Semaine Méd. 8. N.Y. Med. Jour. 9. Obstetric Gaz. 10. Revue de Chir. 11. l'Union Méd. 12. Jour. des Sci. Méd. de Lille. 13. Brit. Med. Jour. 14. Brit. Med. Jour. 15. Brit. Gyn. Jour. 16. Obstetric Gaz. 17. Trans. Phila. Obst. Soc. 18. N.Y. Med. Jour. 19. Jour. Am. Med. Assoc. 20. Bull. Soc. de Chir. 21. Goodell at Phila. Obst. Soc. 22. Jour. Am. Med. Assoc. 23. Revue Méd. de la Suisse Romande. 24. Annales de Gyn. 25. Goodell, Lessons in Gynecology. 26. Brit. Med. Jour. 27. Jour. Am. Med. Assoc. 28. Virchow's Arch. 29. Brit. Gyn. Jour. 30. Brit. Gyn. Jour. 31. Arch. f. Gyn. 32. Jour. Am. Med. Assoc. 33. London Med. Rec. 34.



Trans. London Path. Soc. 35. Brit. Gyn. Jour. 36. Cinn. Lancet-Clinic. 37. Pittsburgh Med. Review. 38. Bull. d. l. Soc. Anat. 39. Maryland Med. Jour. 40. Deut. Med. Woch. 41. Smith, Abdominal Surgery. 42. Pacific Rec. 43. Jour. des Sci. Méd. de Lille. 44. Die Krankheiten des Ovarien. 45. Brit. Med. Jour. 46. Brit. Med. Jour. 47. Cyclop. Obst. and Gyn. 48. Med. Press and Circular. 49. Med. Press and Circular. 50. Brit. Med. Jour. 51. La Semaine Méd. 52. Rep. of Corresponding Ed. 53. Miss. Valley Med. Monthly. 54. Brit. Med. Jour. 55. N.Y. Med. Journal. 56. London Med. Rec. 57. Obstetric Gaz. 58. Med. Register. 59. Brit. Gyn. Jour. 60. Lancet. 61. Brit. Med. Jour. 62. Cent. f. Gyn. 63. Brit. Med. Jour. 64. Revue de Chir. 65. Bull. de la Soc. Anat. 66. Brit. Med. Jour. 67. Gaz. des Hôpitaux. 68. Lancet. 69. l'Union Méd. 70. Hospitaltidende. 71. Obstetric Gaz. 72. Trans Am. Gyn. Soc. 73. Lancet. 74. Terrillon, Arch. de Tocol, 1885. Cribb, Lancet, 1886. Cortiquère, Dictamen, Madrid, 1884. 75. Deut. Med. Woch. 76. London Med. Rec. 77. Glasgow Med. Jour. 78. Lancet. 79. Münchener Med. Woch. 80. Am. Lancet. 81. An. de Gyn. 82. l'Union Méd. 83. Edinburgh Med. Jour. 84. An. de Gyn. 85. Goodell, Lessons in Gynecology. 86. Brit. Med. Jour. 87. Edinburgh Med. Jour. 88. Annals of Gyn. 89. Edinburgh Med. Jour. 90. Glasgow Med. Jour. 91. An. de Gyn. 92. Med. News. 93. Med. News. 94. Homan's Laparotomies. 95. Brit. Med. Jour. 96. Am. Jour. Obst. 97. Berlin Klin. Woch. 98. London Med. Rec. 99. Brit. Med. Jour. 100. Edinburgh Med. Jour. 101. Weekly Med. Review. 102. Jahrb. K. K. Gesell. in Wien, 1883. 103. Gaz. Méd. de Paris, 1886. 104. Arch. f. Gyn. 105. Gehle, Ueber die primäre Tuberkulose der weiblichen Genitalien, 1881. 106. Hegar, Genital-tuberculose des Weibes. 107. Arch. f. Gyn. 108. Arch. f. Gyn. 109. Cent. f. Gyn., 1885. 110. Lehrbuch des Frauenkrankheiten, 1886. 111. Gaz. des Hôpitaux. 112. Deut. Med. Zeit. 113. Lancet. 114. N.Y. Med. Jour. 115. N.Y. Med. Jour. 116. McMurtrie in Med. Standard. 117. London Med. Rec. 118. London Med. Rec. 119. La Semaine Méd. 120. An. de Gyn. 121. An. de Gyn. 122. Rep. Sabbatsberg Hosp. 123. The Satellite of the Annual. 124. Arch. f. Gyn. 125. London Med. Rec.

[Undated references apply to journals published in 1887, and original articles can be found by consulting the indexes of the respective publications.]

# DISEASES OF THE VAGINA AND EXTERNAL GENITO-URINARY ORGANS.

BY WILLIAM H. PARISH, M.D.,

PHILADELPHIA.

---

## CYSTS OF THE VULVA.

*Varieties and Origin.*—Dr. Koppe<sup>1</sup> states that Weber has shown that in the early development of the round ligament there exists a canal along its middle which gradually becomes obliterated. Gottschalk states that occasionally an effusion of blood may occur in an unobliterated canal in the round ligament. Koppe states further that regular, symmetrical serous cysts have been demonstrated as occurring within this ligament. When hæmorrhage occurs within a patulous canal of this ligament the effusion can be but slight without the blood forcing apart its fibres and escaping into the surrounding tissues.

Koppe recognizes the fact that cysts of the upper portion of the vulva may be due to distension of the vaginal process of the peritoneum that envelops the round ligament. Such cysts are frequently overlooked, inasmuch as they often produce no symptoms and remain innocuous for years. They have been misunderstood and wrongly treated. Gottschalk has reported a case in which a truss was worn for three years under medical advice until decided traumatism resulted. I have recently seen such a cyst in a patient whom a gynecologist had advised to wear a truss. Koppe states that most of the serous cysts of the labium must be explained as distensions of the vaginal process of the peritoneum, the inguinal portion of the process being obliterated.

Effusion of blood may occur within this patulous peritoneal pouch as a result of trauma occurring during childbirth or coition, or from accidents, as falls, etc. If the blood is limited in amount, it may remain innocuous for years and occasion the brownish or chocolate color of the cyst-contents. The cysts may increase in

size so as to become troublesome from their bulk, and they may become inflamed and painful. The contents of cysts of either the round ligament or of the vaginal peritoneal process may be thin and serous, or thick and viscid, nearly transparent or yellowish, or, when intermixed with blood, of brownish or reddish color.

The observations of Gottschalk and of Koppe in reference to the origin of vulvar cysts are interesting. Doubtless such cysts when extending into the lower portion of the labium have been mistaken for cysts due to distension of the vulvo-vaginal gland.

Dr. Lagrange<sup>4</sup> has described a cyst of the labium as probably due to the invagination into the labium of a portion of the integument and also of the lower end of Müller's duct. He bases this view upon the epithelial lining being in part of stratified epithelium and in part of ciliated epithelium. These forms of epithelium exclude the vaginal peritoneal process, the gland of Bartholini and also the Wolffian (or Gärtner's) duct. In this duct the epithelium is non-ciliated. Hence Lagrange argues that the presence of ciliated epithelium indicates the presence of remains of the duct of Müller. He says nothing of the canal pronounced by Koppe to extend along the round ligament, and which might contain ciliated epithelium.

Vulvar cysts may be due to distension of lymph canals, as in other portions of the body, and dermoid and other cysts may occur; but such cysts are not of course peculiarly vulvar cysts.

The gland of Bartholini may become distended and inflamed, and constitute an abscess usually of small size and located primarily toward the inferior and internal surface of the labium.

*Treatment.*—M. Trélat,<sup>5</sup> in discussing the treatment of "cysts of the vulvo-vaginal" gland, says that simple incision is faulty and usually followed by fistulous tracts. He gives two methods as warrantable: (1) incision with drainage with rubber tube,—uncertain and tedious; (2) extirpation of the cyst,—more serious, but more certain of cure and more rapid. Desnos,<sup>2</sup> in treating a large vulvar cyst, made an incision along the inner wall of the cyst, and though the cyst burst, enucleated it entirely, removing with it a portion of the lower vagina adherent to the cyst wall. A drainage tube was used and a cicatrization was complete in seven days.

Baer<sup>3</sup> attempted to enucleate a large cyst believed by him to be of the vulvo-vaginal gland, but found the bleeding so profuse

and so difficult to control that he desisted and packed the cyst cavity with lint saturated with an iron styptic, with cure. Lagrange<sup>4</sup> successfully enucleated a cyst the size of a fowl's egg, after attempts had been made, unsuccessfully, by another surgeon to obliterate the cavity with injections of chloride of zinc.

#### ABSCESS OF THE VULVO-VAGINAL GLAND.

*Etiology.*—A. Ravogli<sup>6</sup> states that the most frequent cause of abscess of the gland of Bartholini is gonorrhœal infection. The abscess may occur during the acute manifestations of gonorrhœa, or may not appear until after the subsidence of the active gonorrhœal symptoms. The infection may produce only a catarrhal condition of the gland, or of its duct, of a chronic character and liable to become suppurative.

*Treatment.*—Croom<sup>7</sup> incises the abscess on the inner surface, and thus avoids severing the transversus perinei artery. After emptying the cavity, he packs it with carbolized lint. Ravogli opens on the skin surface in order that the wound may not be exposed to the contact of the irritating gonorrhœal discharge.

#### LABIAL AND VAGINAL THROMBUS.

Koppe<sup>9</sup> states that the bleeding may occur into the vaginal peritoneal process of the round ligament or into a patulous canal in the round ligament. Usually, however, the hæmorrhage takes place into the areolar tissue.

*Frequency.*—Sinclair and Johnston, in an analysis of 13,748 labors, found only seven cases, all of the labia, three occurring before labor and four after. Lwoff<sup>10</sup> reports several cases occurring in the non-pregnant from traumatism.

*Predisposing Causes.*—According to Lwoff, neither age, nor the number of pregnancies, nor the length of labor determines a thrombus. Varicose veins of the external genitalia are rather to be considered as a predisposing cause than either hemophilia or inherited alterations in the tissues of the vagina or vulva. Dr. de Saint Martin has reported an instance ascribed by him to atheroma of the vaginal arterioles.

*Prophylaxis.*—Lwoff states that prophylaxis is not of avail except where varicose veins exist. Very many authors do not recognize varicosity as leading to thrombus, and doubtless with

most practitioners no prophylaxis is exercised. When a thrombus is recognized as forming during labor, Lwoff recommends pressure with cold compress or with the hand. After labor he suggests tamponing the vagina with a rubber bag distended with ice water, removing it at intervals to insure the escape of the lochia.

*Terminations.*—Lwoff gives the following as the methods of termination: (1) death from flooding, without or with opening of the hæmatoma; (2) death from septic infection, especially after incision; (3) incision of hæmatoma and recovery; (4) incision followed by fistulous tracts; (5) absorption without opening, with recovery. He further says that traumatic thrombus in the non-pregnant is of more favorable prognosis than in the puerperal, there being less liability to decomposition of the contents, and hence less danger of septic infection.

Parker<sup>11</sup> and de Saint Martin have reported cases terminating in spontaneous opening with the escape of large amounts of blood, producing serious anæmia, with eventual recovery. Dr. Jones<sup>12</sup> patient experienced eclampsia, with suppression of urine, after an incision of the sack, followed, however, by cure.

*Treatment.*—Lwoff very properly advises against incising a thrombus too early. If spontaneous opening occurs during labor or after delivery, he recommends cold tamponade, especially with the ice bag, to control hæmorrhage; antiseptic cleansing of the blood cyst with subsequent antiseptic syringing, hydrarg. chlor. corros., 1 to 3000, being the most effective. Iodoform and glycerin tampons are also recommended by him. He cautions against packing the cyst cavity with an iron styptic as leading to secondary hæmorrhage on the detachment of the hard masses produced by the iron.

The editor has reason to know that occasionally a thrombus is still treated by minute punctures, though such a procedure is irrational and excessively dangerous.

#### TRACHOMA PUDENDORUM.

Prof. Tarnovsky,<sup>13</sup> of St. Petersburg, states that there also exists a true trachoma pudendorum. On the mucous surfaces of the labia majora and at the upper commissure of the labia minora can be seen isolated, slightly grayish or yellowish nodules, of about the size of a pin's head, surrounded by a slightly

hyperæmic halo. They are mistaken for papillæ, or sometimes for comedones. The nodules gradually become paler, though they remain raised. Some disappear, while others are visible only with a magnifying glass. The latter group themselves, and later form an oval patch 3 or 4 cm. by  $1\frac{1}{2}$  or 2 cm. Its epithelium thickens, roughens and scales off, leaving a velvety surface. Under the finger it seems harder than the membrane around, and gives a sensation of sand under the mucosa. Crepitation is distinct when scratched with a scalpel. The patch does not easily bleed. When not treated, this condition may last for years, or, disappearing at one spot, reappear at another. The mucous membrane generally is somewhat congested and there is a muco-purulent discharge. In very old cases the patch becomes converted into cicatricial tissue, the mucous membrane being shrunken.

This new growth contains enormous numbers of micrococci within the epithelium cells, and they are considered the cause of the process. Trachoma pudendorum produces some, though not intense, itching, relieved by pressure, or by cold applications, as cold water, or by the introduction into the vagina of cold substances, as a knife handle or a glass bottle. Warmth in bed increases the itching, and, especially if the disease is located near the clitoris, arouses sexual desire and induces masturbation. Occasionally there is no pruritus. Prof. Tarnovsky during 7 or 8 years met with 60 or 70 cases, usually in prostitutes or in young married women whose husbands had had gonorrhœa, occasionally in girls of 5 or 6 years, and in a few old women. He recommends superficial scarification and applications of 1 to 2000 solution of corrosive sublimate, or a 5 per cent. solution of carbolic acid, or argent. nitrat. 5 to 10 grs. to water 1 ounce. A few applications will cause a disappearance of the patches. The affection is infectious. Tarnovsky believes that many cases of cervical stricture or endohyperplasia, and hypertrophy of the lips of the uterine os, and also stricture of the urethra in men, are due to trachomatous thickening of the mucous membrane.

#### VAGINISMUS.

Sims defined this affection to be a spasm of chiefly the sphincter vaginæ or constrictor cotunnii muscles, with also spasmodic contraction of such associated muscles as the sphincter

ani, levator ani, and transversus perinei. Mr. Tait has maintained that the condition is not one of spasm of the sphincter vaginae muscle, since in eleven dissections he found in one instance only a mere trace of the muscular fibres supposed to produce the spasmodic closure. Authorities generally, however, recognize a spasmodic condition of the sphincter vaginae muscle with other neighboring muscles; but the contraction extends also to the adductor muscles of the thigh and to the glutei.

*Etiology.*—Emmet deems the cause to exist in the majority of cases in an exaggerated sensitiveness about the hymen, kindred to neuralgia, and arising in anæmic and nervous women. He says, however, that there will occasionally be found tender cicatrices about the perineum or in the cervix, or it may be inflammation of the vagina, vulva, urethra, or of the vesical neck. Winckel has found, in several instances, microscopic alterations of the hymen which he interprets as the cause of the spasm. E. More Madden,<sup>19</sup> in a recent paper, finds the most rational explanation in the hysterical temperament of the individual with, in some instances, also an abnormal condition of the pudic nerve. G. Granville Bantock<sup>20</sup> has reported six cases observed by himself. In none of these did he find any lesion about the hymen or any of the external genitalia; but congestion of the uterus or vagina, or both, with leucorrhœa. In one instance the cervix was excoriated, in another there was narrowing of the cervical canal with a cicatrice from a division of the cervix made by Sims a few years previously, and in another patient the uterus was retroverted. Bantock concludes that vaginismus is essentially of reflex origin, and in his experience the reflex contraction has been dependent upon uterine derangement.

In the discussion on this paper, Dr. Barnes stated that this affection might be due to one of several causes. He believed that Oldham was right in ascribing some cases to diseased conditions of the vulva, but yet others seemed due to uterine inflammations and displacements. Dr. Routh referred to coccygodinia as an occasional cause. Dr. Fenwick reported an instructive and marked case of the affection in which excision of the hymen and dilatation, even to rupture of the perineum in the hands of another practitioner, had failed to relieve the symptom. Coition was still impossible. Dr. Fenwick ascertained the existence

of hæmorrhoids and secured their removal; and in a few weeks there was not the slightest vaginismus. Dr. Rutherford found in one instance no lesion, but the patient was greatly troubled with seat-worms. Remedies directed toward getting rid of the seat-worms rapidly cured the vaginismus. Dr. Blake referred to vaginismus as a result of plumbism, and stated that it is a reflex that might exist in the course of any pelvic disease. He had never seen a primary idiopathic vaginismus. Mr. Tait scouted the theory of vaginismus, *i.e.*, of spasm of the sphincter vaginae muscle. He believed the symptom of impossible coition in such cases due to two causes,—fear in many, and disease of the vestibule in the rest. The vestibular disease was most usually a serpiginous vascular degeneration of the mucous membrane, ending in atrophic contraction of the vestibule.

Tillaux<sup>21</sup> thinks that vaginismus is the result of vulvar hyperæsthesia. Hegar and Kaltenbeck<sup>22</sup> call attention to the fact that in some cases the vaginal orifice is too far forward and that the anterior position of this orifice is dependent upon an abnormal obliquity of the pelvis. Consequently there result awkward and it may be unsuccessful attempts at coition and vaginismus may thus eventuate. The affection may arise in a virgin without attempt at coition, or may appear after parturition as a result of local irritation or lesion of the genitals. Diminished potency on the part of the husband may be the cause of the affection. It will be seen from the above that even yet the cause of vaginismus is not agreed upon. By one set of observers the disease is looked upon as usually but a local manifestation of a nervous hysterical condition of the patient, without local lesion, excepting hyperæsthesia. Other observers find nearly always a lesion, apparently trifling it may be in appearance, about the introitus vaginae or in close proximity to it, as of the urethra or lower rectum. Still a third group find that the affection is due to disease of the upper vagina or of the uterus. Doubtless, all of these causes may be operative in different cases. One must not too hastily conclude that the special case is one of essential hyperæsthesia due to anæmia or hysteria. The lesion usually coexists with anæmia and hysteria. Hilton<sup>23</sup> has called attention to the fact that, inasmuch as the three orifices, *viz.*, vaginal, urethral and rectal, with their muscular and cutaneous surroundings, are supplied with



motor and sensitive filaments from the same nerve, the internal pudic, a lesion or irritation about either of these orifices may be productive by reflex action of pain and muscular spasm about all three of them. In accordance with physiological and pathological facts, it is to be expected that in most instances muscular spasm is due to an irritation arising in the sensitive filaments of some portion of the nerve which supplies the muscle in spasm with motor influence. Hence in vaginismus, the lesion will be most frequently found in the course of the distribution of the internal pudic nerve, *i. e.*, in the hymen or lower vagina, or the vulva, perineum, urethra or anus. That a close reflex relation exists between the internal and the external genitals is probably generally recognized, just as there is between the internal and external urinary organs. Hence *à priori* reasoning would lead one to expect that in some instances vaginismus is dependent upon uterine disease. A leucorrhœa may produce such irritation of the vaginal orifice as to superinduce pain and spasm on sexual approach.

*Treatment.*—Dr. Madden says that often operative measures are unnecessary. Remedies should be directed against the constitutional nervous or hysterical disorder. Locally he recommends first to be tried warm sitz baths and vaginal irrigations, the application of a 5 per cent. solution of hydrochlorate of cocaine, or the introduction of vaginal suppositories of cocaine and belladonna. These measures failing, he then resorts to mechanical dilatation of the vaginal orifice. He fully etherizes the patient, introduces a large bivalve speculum, expands it to its fullest extent, and then withdraws it. If the vaginismus is not cured, he repeats the procedure. If these measures fail he resorts to Sims' cutting operation. This consists in first cutting away the hymen with curved scissors and having the patient wear a glass or vulcanite plug until the parts are healed. After cicatrization he etherizes the patient, places her in the lithotomy position, and dilates the vagina as widely as possible with the index and middle fingers of the left hand. He then makes an incision in vaginal tissue on one side down to the raphé of the perineum, and a similar incision on the opposite side. These incisions meeting in the median line and extending backward, complete a Y-shaped incision. For some time subsequently he requires the

patient to wear a vaginal dilator. Dr. Madden has also practiced Emmet's modification of this operation, as follows: With the index finger within the anus, he presses the sphincter ani against the posterior wall of the vagina and then with scissors divides—largely under the mucous membrane—the fibres encircling the vagina on each side. This allows of a large extent of dilatation with a glass plug.

Dr. Madden has succeeded in relieving the most intense vaginismus without any operation other than full dilatation.

Bantock, though finding that the origin of the vaginismus is traceable to uterine disease, nevertheless and very properly resorts to dilatation of the lower vagina as a part of the treatment. This he effects, at times gradually, by means of Sims' dilators worn for two or three hours each day; in other cases at once, either by expanding the speculum or with the fingers. He treats the uterine disorder according to its indications. Of the six cases he reports, five were cured by this treatment without resort to any cutting about the vaginal orifice. In one case the vaginismus was associated with great dysmenorrhœa, and he eventually removed the uterine appendages, yet her condition remained far from satisfactory.

Dr. Barnes has effected cures in simple cases with forcible distension under chloroform. Other cases he has cured by submucous and subcutaneous incisions on either side of the vulva through muscular fibres. He has found Sims' vaginal rests useful, on the principle that muscular contraction cannot long hold out against continuous tension. There follows lessened spasmodic irritability.

Dr. Routh has found it necessary in two instances, after performing Sims' dilatation and cutting operation, to cut subcutaneously the fibres of the sphincter ani muscle before relief could be obtained.

Tillaux practices Sims' cutting operation and follows it up at once with dilatation. P. Mérière<sup>26</sup> has done Sims' operation a number of times, and has also tried Broca's operation of crucial incision of the vaginal outlet by means of the red hot galvanocautery knife, and has, after either procedure, found only temporary benefit in even the most favorable cases. The *Gaz de Gynéc.* says that in essential vaginismus resection of the pudic nerve to

the extent of several millimeters would be the proper treatment if the method of procedure were definitely fixed.

Dr. J. B. Thompson, of Petchaburee, Siam, Corresponding Editor of the *ANNUAL*, reports a case of vaginismus becoming aggravated after parturition. He says, "After an average sized head has already stretched the vaginal canal, is it possible to so stretch this canal with the fingers or any device as to accomplish what parturition seems to have failed to effect? Will Sims' cutting operation give in such a case more than temporary relief?" Hegar and Kaltenbeck hold that Sims' Y-shaped incision produces unnecessarily excessive injury and is to be avoided. They employ manual dilatation with or without division or removal of the hymen. In after-treatment, warm sitz baths and warm compresses, with other local and also general sedatives are directed. They interdict coition until there is no spasm on introduction of a speculum. In cases complicated with considerable dilatation of the urethra, Schroeder operates on the urethra, removing a wedge-shaped portion and uniting the mucous edges in such a way as to carry the diminished meatus farther forward than it is usually placed. Winckel<sup>28</sup> limits the term vaginismus to spasm of the vaginal orifice when due to diseased conditions of the hymen, and hence he finds removal of the hymen an essential to cure. In some instances he has removed, as did Sims, the circumference of the urethral meatus with that of the vaginal orifice. Mann,<sup>29</sup> after removing the hymen thoroughly, unites the edges of the wound thus produced with a continuous catgut suture, hoping to secure such union as will not be accompanied with a scar. When there is no lesion, he dilates with a Goodell speculum and in the after-treatment resorts to Sims' vaginal glass dilators.

The consensus of opinion seems to be that in nearly all cases there is a causative local disorder in connection with the internal or external genitalia or in their vicinity, and that the removal or alleviation of the cause will greatly hasten, and often is absolutely essential to, a cure of the affection. In alterations of the hymen it is necessary to remove that structure; but it is equally as necessary to remove hæmorrhoids or a urethral caruncle, etc., or to relieve uterine congestion or an irritable condition of the urethra or of the lower rectum, etc., when either of these abnormalities exists as a cause of the vaginismus. Dilatation of the vaginal orifice

may not be necessary to cure in all instances, but it is probably always useful. Doubtless the Y-shaped incision about the vaginal orifice is rarely necessary, and should be reserved for rebellious cases.

Neurasthenia and anaemia should be combated with appropriate remedies, but it will be found very difficult to materially improve the general nervousness until after there is decided improvement of the vaginismus. The recommendation of Sims that at the time of dilatation and during the continuance of the anaesthesia the husband should have intercourse with the patient, has been endorsed by good recent authority,<sup>30</sup> but Mann very properly states that it is not to be recommended. Even should pregnancy follow such unnatural approach, it does not necessarily eventuate that parturition will cure the vaginismus. For the vaginismus may be greatly aggravated, as a result of childbirth. Sexual abstinence should certainly be enjoined until a cure has been effected. That Sims' glass vaginal plugs are of material benefit in the after-treatment seems quite generally accepted; but vaginismus has been cured by the writer without resort to that or any similar plug. Parvin and others have found local applications of cocaine in 6 per cent. solution advantageous; but it is not to be expected that application of that drug would effect a cure, excepting in the mildest cases.

#### OCCCLUSION OF THE VAGINA.

Sylvester<sup>31</sup> and Howard<sup>32</sup> have reported each a case of vaginal occlusion due to imperforate hymen. Cullingworth<sup>33</sup> found an imperforate membrane—not the hymen, but a membranous structure—immediately above the hymen and adherent to it. A case has also been reported of nearly complete occlusion by a hymen containing two capillary openings.<sup>34</sup> All of these cases were probably congenital, though Breisky<sup>35</sup> reports an instance of acquired occlusion at the vaginal orifice, simulating a congenital imperforate hymen.

Cullingworth found occlusion of the vagina throughout its lower portion; Polaillon,<sup>36</sup> obliteration of the entire vaginal tube with occlusion of the cervical canal; Schlesinger,<sup>37</sup> absence of vagina with probably absence of the uterus; Lowe,<sup>38</sup> an imperforate condition of one vagina in a case of double uterus and double

vagina; Payne,<sup>39</sup> absence of the vaginal orifice, the vagina and rectum having a common orifice,—the anus. These were probably instances of congenital occlusion, though in some cases one cannot eliminate the possibility of vaginal atresia having been acquired during early girlhood. Townsend<sup>40</sup> treated a patient with occlusion of almost the entire length of the vagina resulting from adhesions following a forceps delivery; and Fenger<sup>41</sup> a case of nearly complete closure by cicatricial tissue.

*Morbid Anatomy.*—Cullingworth's case<sup>42</sup> of membrane simulating closely an imperforate hymen leads one to doubt that cases diagnosed as imperforate hymen are really of that nature. In his case and in that of Howard, there was very decided thickening of the vaginal wall, illustrating that the usual condition is one of not only vaginal dilatation, but also of actual hypertrophy of the vaginal wall. The hypertrophy is of the muscular layer chiefly, and gives to the vaginal walls an increased contractile power. Howard found the vaginal wall œdematous and doubtless in all similar cases the increased thickness of the vaginal wall is due in part to serous infiltration. The septum between the bladder and the rectum may be very thin, not thicker than a normal recto-vaginal septum. In the three cases of Howard, Sylvester and Cullingworth—in which menstrual retention occurred with the obstruction at the vaginal orifice—the uterus was elevated and movable, with but slight distension of the uterus. Even when the obstruction extends quite near to the uterus, it is the vagina that is chiefly distended. If the obstruction is high up in the vagina, and especially if it exists in the cervix, there is most likely to coexist with the vaginal or uterine accumulation a hæmato-salpinx. This was well illustrated in one of Cullingworth's<sup>3</sup> cases, in which there was atresia of the lower vagina and also of the cervix, the latter determining a hæmatosalpinx which burst downward, establishing first a hæmatoma and later making its way into the calibre of the upper vagina. The retained fluid in some of the cases referred to was quite inodorous and, as is usually the case, of the consistence and appearance of dark brown or blackish treacle, though in one case the fluid contained partially coagulated blood with broken down clots; but this was the instance in which a hæmatosalpinx through rupture had been emptied of its contents into the upper vagina. The quantity of retained fluid is most

likely to become greatest when the atresia is at the vaginal orifice, though in an unreported case treated by the editor he removed through a vagina occluded about  $1\frac{1}{2}$  in. from its outlet, 48 fluid-ounces of blood contained almost entirely within the upper vagina. The most uniform symptoms in the cases referred to were the usual ones of menstrual effort with non-appearance of menstrual blood. Some of the patients were well developed and robust. Others were thin, pale, anæmic and nervous. It would seem probable that the nervous and other constitutional disturbances would be greatest when the obstruction was high, as it is then that the tubal involvement and uterine tension most frequently occur. In Schlesinger's patient with total vaginal occlusion and probable absence of uterus, an artificial vagina was made because of the "general neuropathic" existing.

The fact that there may be a menstrual flow with retention is recalled by Lowe's<sup>43</sup> patient with unilateral hæmatokolpos. There may also be a more or less constant oozing of menstrual blood, as reported in the case<sup>44</sup> of a hymen with only capillary openings.

The complications of hæmatosalpinx or of hæmatometra may be masked by the fluid within the vagina. The tumor apparent above the pubes may simulate an ovarian cyst or an enlarged bladder, but on top of it in some instances will be felt a smaller and denser tumor—the latter being the uterus moderately distended. In the patient treated by the editor the abdominal tumor presented the appearance of a cylinder about three inches in diameter in the median line, elevating the abdominal wall, movable, and extending above the umbilicus. In Sylvester's patient, the bulging of the hymen suggested a prolapsed bladder.

*Treatment.*—Breisky advises anæsthesia to lessen contraction of the uterus and of the abdominal muscles. The risk of etherization producing vomiting during or soon after the operation and the consequent danger to a possibly distended and attenuated tube from the contractions of the abdominal walls is not lost sight of by that writer. In long atresias of the vagina anæsthesia is necessary to enable one to make the careful dissection which is requisite to avoid opening into the bladder or into the rectum.

Cullingworth, in his case of an obstruction simulating imperforate hymen, punctured the membrane with a carbolized trocar and permitted the fluid to flow for an hour or more, and then

dilated the trocar puncture to the size of the finger. He resorted to no douching or hypogastric pressure, and enjoined absolute recumbency for two days, with subsequently occasional rising to insure complete drainage. No rise of temperature or of pulse followed, and the patient made a rapid recovery. Cullingworth believes that when the retained fluid has not undergone putrefactive change, it is better to avoid washing out the vagina.

Dr. Sylvester freely incised a bulging hymen and quickly evacuated three pints of offensive fluid, aiding the flow by suprapubic pressure. Townsend, in a case of acquired atresia of the vaginal canal, by dilating, cutting and stretching the adhesions and cicatricial bands at different séances, and at the same time giving internally potassium iodide and tonics, effected an excellent result.

Schlesinger believes that it is unnecessary to transplant a flap of mucous membrane on to the dissected surface, as recommended by Schroeder and others, in order to prevent retraction of an artificial vagina. Polaillon opened up a vaginal canal occluded to almost its entire extent, and waited a week before opening the occluded cervical canal. Howard in his case of imperforate hymen, freely incised the hymen, emptied the vagina at once, washed it out with warm carbolized water and then trimmed off the hymen.

Croom adopts the plan of opening through an imperforate hymen when there is menstrual retention with the hot wire and letting the fluid drain slowly for some days. He then dilates with vulcanite dilators and washes out the vagina with carbolized water. He thinks, erroneously, that the danger of septicæmia rests upon the fact that the fluid flows over a raw surface after incision with a bistoury.

Fenger, after stretching with blunt instruments the cicatricial tissue that very nearly occluded the vagina, aimed to secure patency of the tube by carrying flaps made from the unfolded nymphæ on to the vaginal surface after having revived it. It will thus be seen that different methods of treatment are adopted. Certainly the indication is to evacuate the retained fluid through the vagina, and if there is no vagina to make one. There is weighty authority on the side of rapid evacuation with thorough antiseptic washing. The most important objection to immediate evacuation is that the sudden and great change in position of the uterus and vagina

will drag upon probably a hæmatosalpinx and possibly determine its rupture. Reports of such an accident have been sufficiently numerous in past years to render the possibility of its occurrence worthy of serious consideration; and when practicable the method of drawing off the fluid through a trocar for an hour or more before making a large opening would seem rational and safest. This somewhat gradual evacuation is recommended by Hegar and others. Abdominal pressure to aid the escape of the fluid certainly should be avoided as increasing the danger of rupture of the tube if distended. Washing out both the vaginal and the uterine cavity with antiseptic fluid, preferably with corrosive sublimate in warm water, 1 to 4000, should be resorted to, provided in injecting the uterine cavity, the prompt reflow be insured by using a return tube for the injection.

Doran<sup>45</sup> prefers to open through the obstructing membrane with the cautery knife and to permit the rapid escape of the fluid.

An acquired atresia or stenosis of the vaginal canals may be so extensive and formidable at the onset of labor as to render delivery per vaginam dangerous in the extreme or impossible<sup>46</sup> and necessitate resort to the Cæsarian section or the Porro operation. If the obstruction is such as to prevent, after a Cæsarian section, the escape of the lochia, the Porro operation should be the procedure adopted.

In the after-treatment, confinement to bed for 8 or 10 days should be enforced, though Sylvester<sup>32</sup> permitted his patient, a negress, to leave her bed on the fourth day and no unpleasant symptoms followed. A hæmatosalpinx may gradually empty itself into the uterus. To permit this, several days of rest in the recumbent position should be enforced. The change of position of the uterus incident to assuming the erect position prior to the decided lessening of the tension of the tubal walls by drainage into the uterus, would enhance the risk of tubal rupture. In order to counteract the tendency of a recently opened vaginal canal to contract, it will be necessary in some instances to introduce either a vulcanite plug, a rubber tube, or a Sims' glass vaginal rest. The tendency to retract should be watched for several months at least. Should symptoms of tubal rupture arise, laparotomy should be promptly resorted to. The dangers attending or following evacuation of retained menstrual fluid are, first, rupture of a dilated tube,



and later, septicæmia; with it may be pelvic abscess. In opening, by dissection, a vagina obliterated in part or entirely, a vesical or rectal fistule may be established. Breisky relates an instance<sup>35</sup> in which one operator established a large vesical fistule in an unfortunate patient without finding the uterus. A second operator subsequently essayed to find the uterus and only succeeded in opening into the rectum; later a third operator was more successful and found the uterus.

The eventual result may be a perfect cure, especially when the obstruction is at the hymen. Menstruation returns in such cases normally, and the vaginal walls lose their hypertrophied condition. In other instances, menstruation may not return for months. When the uterus is not well developed, and when the retained menstrual fluid is limited in amount, there may be no appearance of menstruation after the operation and the patient may still suffer with pains due to menstrual molimen, as was the case with Polaillon's patient. Of course an hæmatosalpinx may remain persistent and cause such symptoms as to call for its removal by laparotomy; or an hæmatoma or an hæmatocele may prevent convalescence and demand appropriate treatment.

#### LESIONS OF THE VAGINA AND PERINEUM.

*Causation of Vaginal and Perineal Lacerations.*—Parvin<sup>48</sup> states that of 900 women attendant upon the gynecological clinic of the Jefferson College during the past year, 30 per cent. were suffering from obstetric injuries. He states that many of the tears and other lesions thus occurring are due to the too hasty and improper use of the forceps. At other times the tearing occurs with the delivery of the shoulders, though Parvin believes that the shoulders usually only complete what the head has begun.

*Lesions of the Upper Vagina.*—Hadra<sup>49</sup> has dwelt upon the importance of injuries sustained by the vault of the vagina and by the underlying cellular tissue, such injuries though occasionally dependent upon other causes, as the accidental thrust of a pointed foreign substance up the vagina, or too vigorous cohabitation, are yet much more frequently due to parturition. The vagina may be detached from the uterus, so far as the submucous layers are concerned, without lesion of continuity of the vaginal surface; also inflammatory processes, usually septic in nature, may extend from

a lacerated cervix to the adjacent vaginal and subvaginal tissues. He imputes frequent subinvolution of the upper vagina to these lesions. This subinvolution, extends into the broad and utero-rectal ligaments and to the connections extending from the uterine neck about the bladder to the pubic bone. As a result of such lesions, cicatricial bands are found extending from the cervix, usually laterally, and frequently beneath the mucous membrane. The vagina above the pelvic diaphragm loses its supporting

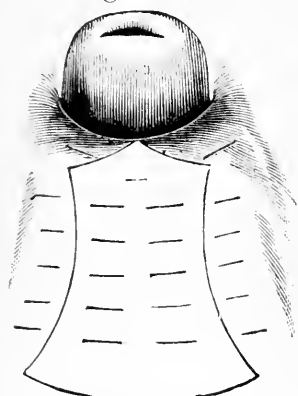


FIG. 1.—MODIFIED SCHROEDER-FRITSCH-SIMON OPERATION.  
(*Medical Register.*)

power and the uterus descends to the diaphragm, or lower with anterior or posterior displacement. Hadra ascribes numerous nervous and other disturbances to these lesions; and as this first step in displacement downward of the uterus is likely to be followed by subsequent yielding of the diaphragm, it becomes important to treat the upper vagina. After referring to the benefits to be derived from astringent applications and injections, and from pessaries, he urges the necessity of performing a plastic operation on the vagina as high up as the cervix. He urges the advisability of performing a modified Schroeder-Fritsch-Simon operation on the posterior vaginal wall, carrying the apex of the denudation up to the attachment of the vagina to the cervix, as shown in fig. 1.

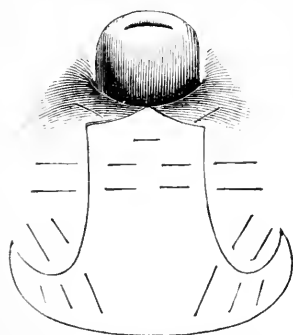


FIG. 2.—MODIFIED SCHROEDER-FRITSCH-SIMON OPERATION.  
(*Medical Register.*)

If there is great redundancy of vaginal tissue about the fornix, he excises extensively in lateral directions in close proximity to the uterus. He removes the entire thickness of the vaginal wall, uses continuous catgut sutures, and aims to secure a thick, dense scar that will contribute in the support of the uterus. When there coexists a lesion of the lower vagina, or a loss of supporting power of the pelvic diaphragm, he carries the denudation down near the vaginal outlet. He also sometimes makes the crescentic denudation along the sulci, as in Emmet's operation for rectocele, and as shown in fig. 2.

Hadra advocates suturing rents of the upper vagina as well as of the cervix immediately after labor,—such a procedure not being so difficult as usually supposed, and not only checking hæmorrhage at the time, but also diminishing or preventing septic infection and encouraging involution.

#### RELAXATION OF THE PELVIC DIAPHRAGM.

Hadra<sup>49</sup> has suggested an operation illustrated in fig. 3. The aim is to shorten the levatoric shanks, *i.e.*, the bundles of fibres of

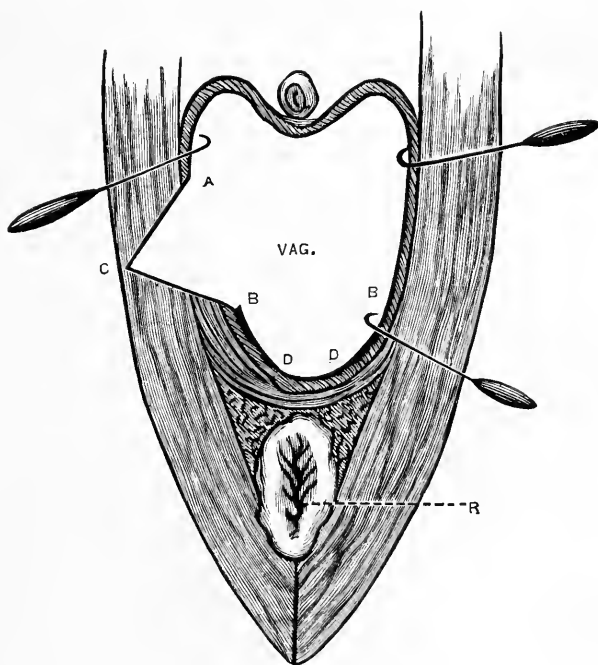


FIG. 3. HADRA'S OPERATION.—(*Medical Register.*)

the levator ani which pass forward by the sides of the vagina to the pubic bones. He has done the operation only on the cadaver. He says: "The shanks of the levatores on each side of the vagina bending up into the pubic arch can be easily found, and a simple cut through the vaginal wall will expose the brim of the muscles. An incision is made in the vagina along this muscular brim (A B, fig. 3), the finger is then hooked under the muscle and it is pulled toward the vagina. A triangle (A C B) can now be cut out of the muscle without any difficulty—of course with its base

toward the vagina—which will correspond in size to the degree of shortening desired. Strong catgut sutures should be used to unite the muscular excision, and by closing the vaginal wound the operation is finished. Nothing is more evident than the prompt effect of the operation upon the promontory.” He uses the term promontory to indicate the elevation in the normal posterior wall of the vagina caused by the edge of the pelvic diaphragm behind the rectum and which carries forward the rectum and with it the posterior vaginal wall. “The rectum will not be injured if proper places are selected for the incision. The finger in the rectum might guard against such danger.” He also says that another way to utilize the easily accessible bundles of the levator muscles would be to expose them in the line *B D*, fig. 3, and then to unite them. This should be done as near as possible to the levatoric promontory without getting into the rectum. The effect of either of these operations would be to lift the posterior vaginal wall and to narrow the diaphragmatic slit.

Emmet's operation for the restoration of the vagina and of the perineal septum is too well known to call for a description here. That this operation is not in itself sufficient when a tear extends into the perineum, is recognized by its author himself, and in such instances it is necessary to introduce additional perineal sutures. Fig. 4 represents the sutures secured along the sulci, and the others introduced but not secured.

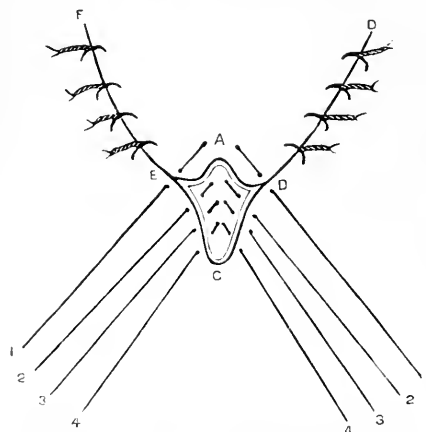


FIG. 4.—EMMET'S OPERATION WITH ADDITIONAL PERINEAL SUTURES.—(*Medical Register*.)

A similar operation to that of Emmet is Wylie's, described by Pardee<sup>50</sup> as follows:—

“Just before the patient is etherized, a hot vaginal douche of corrosive sublimate (1 to 5000) or carbolic acid (1 to 40) is given. The caruncles marking the posterior border of the vaginal orifice are found, and mark the limit of the denudation upward or toward the pubes. A tenaculum is hooked into the crest of the rectocele, which is drawn down, and an examination is made with the finger

to find at what point the tissues on either side of it are put on the stretch by the traction. This point, or one a very little above it, is made the limit of denudation backward into the vagina.

“Commencing from below, a strip of mucous membrane as wide as can be conveniently cut is snipped off, following the line of junction of the skin and mucous membrane from the level of the inferior caruncle on one side to the same level on the other. We then denude all the posterior surface of the vagina up to this level, till we reach the beginning of the sulci running on either side of the rectocele. Our object is to unite the vaginal walls above the sulcus on one side with the corresponding portion of the vaginal wall on the other side, so obliterating the sulci and forcing back the rectocele. If we carry denudation too high we shall find it difficult to bring the two sides together without undue tension. If we are too timid our support will be insufficient, and the operation will be but a partial success. The proper level having been determined, we continue the denudation upward till we reach the points in the vagina which we marked out as the limits of tension from the apex of the rectocele. This will usually be about one and a half or two inches from the orifice. In denuding this portion of the vagina we still work from side to side, carrying the strip of mucous membrane down into the sulcus, up over the rectocele, down into the other sulcus, and up to the level we have marked on the other side. In doing this we should not cut very deeply, but preserve as much as possible of the muscular substance of the wall of the vagina over the rectocele. In the sulci we remove all tissue till we come to the fibrous external sheath of the vagina. When we are through, the denuded surface will be nearly square, or, if the rectocele be very large, a parallelogram, the greatest length being transverse to the axis of the vagina.

“The first three or four sutures are placed as in the old ‘butterfly’ operation, entering about a quarter of an inch outside the line of junction of the skin and mucous membrane, passing backward and downward and then upward and forward, emerging on the other side at a point corresponding to the point at which they entered. The last one of these external sutures should be entered a little above the level of the caruncle which marked the limit of denudation upward. The remaining sutures, four or five in number, are usually entered in the mucous membrane a little above

the line of denudation, passed down below the angle formed by the sulcus, and up to the crest of the rectocele. It is best to bring the needle through at this point and reintroduce it at the same point. It then goes down the other side of the rectocele, round the angle of the sulcus, and up the opposite vaginal wall, till it emerges above the line of denudation opposite the point where it entered on the other side.

“When the sutures are placed, and before they are tightened, the sphincter ani should be thoroughly stretched. This, to a

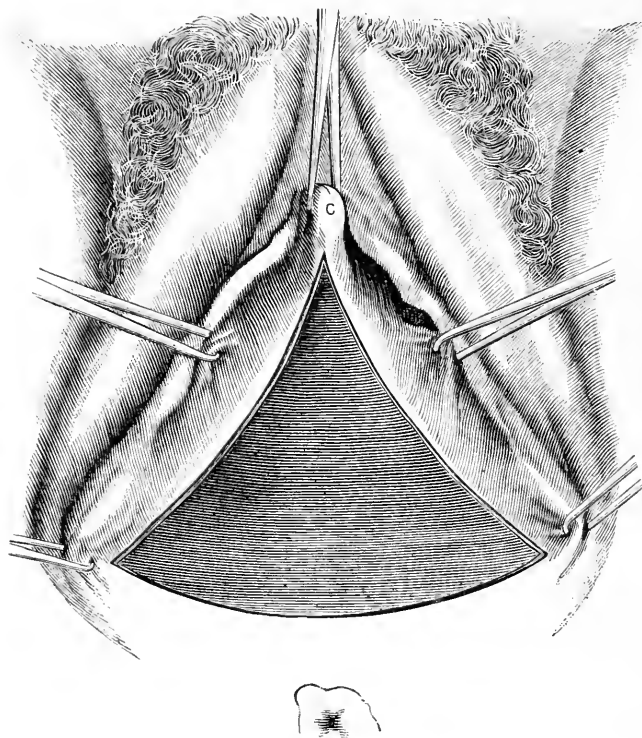


FIG. 5.—SIMON-HEGAR OPERATION.—(*Medical Register.*)

certain extent, relieves the tension on the sutures, and prevents straining at stool. The sutures should be tightened from below upward.”

The above cut (fig. 5) represents the Simon-Hegar operation on the posterior vaginal wall. Wylie's operation seems to be nearly the same procedure, extended sufficiently laterally at the base of the triangular denuded surface to include the sulci.

In Wylie's operation the denudation is not carried to the acute angle represented in the figure. The figure also represents the tissues made tense with bullet forceps which serve the purpose better than tenacula.

The editor of this section has performed the operation described as Wylie's for several years; in fact, before Emmet described his operation at the meeting of the American Gynecological Society in Philadelphia. In doing the operation he has at times carried the denudation to the entire height of the vagina, and extending it laterally in the lower vagina beyond the sulci. He has in this way remedied the most marked rectoceles, and permanently cured the most aggravated constipation of 15 to 20 years' duration,—in one instance the constipation during 18 years having been usually of from one to three weeks' duration.

For protrusion of the uterus with rectocele Mr. Tait extends the perineum forward by a procedure in which, the patient being on the back, he makes a horse-shoe incision around the perineum. This incision is carried deeply into the labia, and when its lips are separated has a V shape. He introduces his suture in such a manner as to open out the V on each side and to approximate their surfaces, at the same time rendering them plane surfaces. He, in effect, turns two thick flaps forward into the vagina, and extends the perineum forward so as to form a shelf on which the uterus and vagina rest, and which "rarely gives way."

#### COMPLETE LACERATION OF THE PERINEUM.

Piqué<sup>51</sup> has reviewed various operations devised for the relief of this condition, and gives the preference to those of Emmet and of Richet. Emmet's operation, described in the third edition of his book, and represented in fig. 6, has been generally adopted by the surgeons of France. Richet's procedure consists in first making a curvilinear incision through the cicatricial tissues extending from the skin, on one side of the laceration to the skin on the other side immediately outside of the vaginal mucous membrane and parallel to it, carrying the incision from 3 to 6 millimetres in depth,—its least depth being at the angle of the rent. He thus splits the septum and procures a flap of vaginal mucous membrane. His next step is to denude the general cicatricial surface. He now turns the flaps into the vagina, approximates their raw surfaces, and secures them in

approximation with silver sutures. He also introduces deep and superficial sutures of silver wire from the perineal surfaces. Piqué claims that with this operation the sphincter ani is restored to its functional activity, a strong perineal body is secured and the dreaded consecutive recto-vaginal fistule is avoided. Yet he prefers Emmet's operation in complete lacerations extending a short distance up the septum. In deeper tears of the septum, say of 2 inches or more, he claims that the circular perineal sutures of Emmet intended to draw downward the recto-vaginal septum, will tear through that attenuated structure and permit the occurrence of a fistule. In such deep tears he claims that Emmet's procedure should be modified by the formation of the vaginal flap of Richet in order to avoid a recto-vaginal fistule. This fistule, unless very

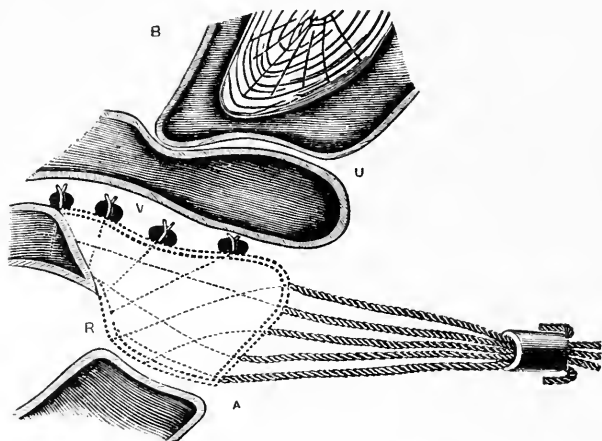


FIG. 6. EMMET'S OPERATION.—(*Medical Register*.)

small, renders the result of the operation practically a failure because of fecal incontinence. Richet introduces only vaginal and perineal sutures. Mr. Tait<sup>52</sup> splits the septum in such a manner as to produce on each side two flaps. One set he turns into the vagina, the other into the rectum, introducing vaginal, rectal and perineal sutures. He thus applies to this operation the procedure of "flap splitting" advocated by him. In this operation he claims an exceptionally large experience and a very gratifying success.

Dr. P. F. Chambers<sup>53</sup> has described an operation for laceration of the perineum involving the rectum, which he has performed eight times recently with complete success in each instance. After having thoroughly emptied the bowels by means of a cathartic pill



given day and night for several days, he operates as follows: The end of the sphincter muscle being seized with a tenaculum, while with another introduced into the rectal mucous membrane at the angle of the rent, the tissue is made tense, a strip about one-eighth of an inch in thickness, consisting partly of rectal muscular fibres, is removed with scissors. The same thing is done on the other side. Before continuing the denudation further, the rectum is closed in the following manner. Pieces of silkworm gut, ten inches in length, with a needle threaded at either end, are introduced from the vaginal edge of the denudation into the rectum, passing through undenuded rectal membrane. The ends of these sutures are secured in the rectum by tying and hang out of the anus. The second part of the operation, done after closing the rectum, consists in the denudation and suturing of the vaginal portion of the rent. The denuded surfaces here are more extensive and silver wire is used. Each suture is introduced from the vaginal surface and just catches up the ridge formed by the rectal sutures. The vaginal suture is secured by forcing over the ends a little spiral of silver wire, and above that a shot. The silver sutures are removed on the ninth day. The worm gut sutures will not be absorbed, but are not removed unless they disturb the patient. They usually drop out in from two to three weeks.

In a discussion following a report on this method of operating, Dr. T. A. Emmet insisted upon securing a daily movement of the bowels after the operation, but that the operation should not be performed in cases in which there was a history of syphilis.

Heinrich Fritsch<sup>54</sup> has adopted the following method of operating in complete perineal laceration. He makes an incision  $1\frac{1}{2}$  in. in depth on each side so as to separate the rectum from the vagina and loosen the ends of the sphincter ani muscle. This incision extends the height of the scar. A thread is now passed through the ends of the sphincter on each side and they are drawn downward so as to restore the shape of the rectum. This causes a turning of the rectal mucous membrane into the rectum. He now closes the rectum by passing catgut sutures from the anterior surface of the rectal wound. These sutures do not appear in the rectum and are knotted so that the knots and the entire sutures are hidden when the operation is finished. Now the threads in

the sphincter ends are withdrawn and the anal wound surfaces are approximated with catgut.

At this stage the perineal wound is similar to a partial perineal laceration. He now draws forward with tenacula the vaginal portions of the perineum and closes the wound with terraced sutures of catgut if it is a deep one. Two or three deep external sutures may be needed. If the surfaces do not fit accurately, a limited denudation may be necessary.

Fritsch has discarded the continuous catgut sutures about the rectum since Lauenstein's publication.<sup>55</sup> He introduces no sutures through the rectal mucous membrane, as gases or fluids are liable then to be forced along the suture tracts. After his operation he finds it best to introduce a small rectal tube with iodoform gauze about it, so as to permit the escape of gas.

The annexed cut (fig. 7) is intended to represent Tait's operation for complete perineal laceration. Of the operation Mr. Tait<sup>56</sup>

says: "Having the folds of the buttocks firmly pulled apart so that the cicatrix is put on the stretch, I enter the point of the scissors at its extreme end on one side, and, keeping strictly to its line, I run through to its other extremity. The incision is about  $\frac{3}{8}$  in. deep, and forms two flaps, a rectal and a vaginal. From each end of the incision it is carried forward into the tissue of each labia for about an inch, and again backward for about a third of an inch." He thus forms flaps turned respectively forward into the vagina and backward into the

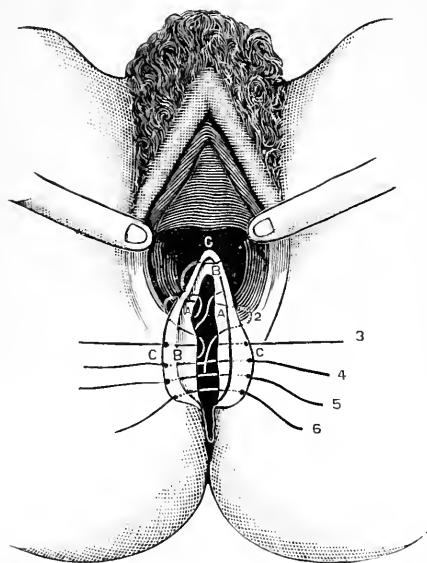


FIG. 7. TAIT'S OPERATION.—(*Medical Register*.)

rectum. Sutures are introduced from the rectum, from the vagina and also from the cutaneous surface. Mr. Tait states that he has had only two failures "in many hundreds of cases." He leaves the stitches in three or four weeks and washes out the vagina and the rectum daily. His operation has certainly special merits.

Doran<sup>57</sup> adopts with high commendation an operation performed by Mr. Bantock in which rectal and perineal sutures are used, with others from the vaginal surface in occasional cases.

#### VAGINAL ENTEROCOELE.

*Etiology.*—Etheridge<sup>58</sup> has reported a large vaginal enterocoele occurring in a young woman while “jumping the rope” in the sixth month of her first pregnancy; and Tucker<sup>59</sup> a case produced by jumping from a wagon in the seventh month of pregnancy. The editor of this section met with a small anterior enterocoele produced four months after labor, during an attempt to raise a weight while in a stooping posture.

*Symptoms.*—In Etheridge’s patient the tumor appeared suddenly in the vagina and eventually when straining pressed downward external to the vulva. It did not interfere with delivery and must have been replaced before the descent of the child. The tumor mass evidently contained gas, descended to the left of the uterus and in front of the broad ligament, and could be easily reduced. The edges of the ring could be readily felt on digital examination. Tucker’s patient passed through a normal labor, though prior and subsequent to labor the intestine descended when in the erect posture so as to form a large tumor at the vulva. When in the recumbent posture it replaced itself.

*Treatment.*—Dr. Etheridge succeeded in effecting retension with the aid of a Fowler pessary, and hence advised against operative interference as dangerous and uncertain. In the discussion following the report of this case, Dr. Philip Adolphus stated that no retentive apparatus was worthy of trial as tending to increase the trouble by distending the vagina. He preferred an operation per vaginam to an abdominal section. He recommended the following procedure adapted from Stoltz’s operation for cystocoele: The patient being placed in Simon’s position with the perineum retracted, the hernia is to be reduced and kept in place by means of armed probangs. An incision is to be made over the tumor, and the tissues divided until the ring is exposed. This ring is to be surrounded by a running ligature of very heavy catgut, and then closely approximated, or interrupted catgut sutures may be used to effect the same purpose. Then remove a piece of the vagina, larger than the protruded tumor, over the region of the hernia.

Close the wound by running a circular ligature of carbolized silk in and out an eighth of an inch from the margin of the wound, and all around it. The two ends are then to be drawn tight, but leaving a small puckered opening into which a drainage-tube may be introduced. Great care must be exercised not to wound the ureters or the peritoneum. Dr. Byford believed that in Etheridge's case operation by abdominal section or per vaginam could not produce a permanent cure. In anterior vaginal enterocoele Byford recommended the performance of Alexander's operation of shortening the round ligaments and so pull forward the uterus and the broad ligaments as to furnish a barrier to the descent of the intestine. If the vaginal wall was redundant, a circular piece could be removed from it.

Dr. Tucker operated in 1883 almost exactly in accord with the plan suggested by Dr. Adolphus. It seems, however, that Tucker did not publish the report of his operation until after the publication of the suggestion of the latter. Dr. Tucker's patient was cured of the enterocoele by the end of the third month after the operation; but in the mean time she experienced high temperature, pelvic peritonitis, and pelvic and labial abscesses.

#### CYSTS OF THE VAGINA.

*Origin.*—Prof. Baumgarten<sup>60</sup> states that these cysts arise either in the Wolffian or Gärtner's ducts, in Müller's ducts, in the glands of Preuschen, or in dilated lymph ducts. Freund and Veit have traced cysts observed by them to the Wolffian bodies. Preuschen has reported cysts developed from the vaginal glands known under his name. The variety in the location of the cysts, in the character of their contents, and in the lining epithelium indicate a diversity of origin. Baumgarten says that all vaginal cysts, not including hæmatomas, arise within pre-existing anatomical structures. He reports cases decided by him to have arisen from the remains of the Wolffian or Gärtner's ducts, because of the existence of large non-ciliated cylindrical epithelium, and because the cysts, being underneath the mucous membrane, excluded the possibility of having originated in the superficial glands of Preuschen. He argues that they could not have originated in the ducts of Müller, inasmuch as the vagina and the uterus were fully developed.

M. Chéron<sup>61</sup> divides vaginal cysts into superficial and deep. The first variety develops at the expense of the epithelial layer of the vagina. The deep cysts are beneath the mucous membrane, within the underlying areolar tissue. They are formed in the "serous pouches." They have thick, firm walls lined with cylindrical or pavement epithelium. The views of Baumgarten as to the origin of vaginal cysts are more exact and certainly more worthy of acceptance than those of Chéron.

*Character of Contents.*—Chéron states that the superficial cysts contain a gelatinous material and are considered myxomatous. According to him, the deep cysts are true hygromas, containing a thin serous fluid. Baumgarten says that the contents of vaginal cysts may be milky, mucoid or serous.

*Location.*—Chéron<sup>14</sup> states that the favorite site of the deep cyst is in the connective tissue, between the vaginal and the urethral walls; and that, after attaining a definite size, they are, when thus located, very liable to open into the urethra and to establish a urinary receptacle filled during the act of urination. He has met with a number of such instances, and quotes a case in which, subsequent to the establishment of this communication, there formed in this receptacle a large urinary calculus.

*Symptoms.*—In addition to mechanical disturbances when large, Chéron states that he has seen decided nervous disturbances sometimes dependent upon these cysts. Usually, however, they produce no very well marked symptoms.

*Treatment.*—There are two methods: (1) enucleation simple and safe in small cysts, difficult and dangerous in the larger ones; (2) free incision and antiseptic packing, more safe and quite certain of cure. Of course, with either method careful antiseptic measures should be carried out before, during and after the operation. In a few cases that I have seen, free incision, evacuation and antiseptic packing have effected satisfactory cures.

#### STRICTURE OF THE URETHRA IN WOMEN.

Van de Warker<sup>62</sup> believes that stricture of the female urethra is as frequent as a like condition in the male, and that the consequences are as serious; yet, except as a result of traumatism, an impervious urethra, or an exceedingly narrow stricture does not occur in women. However, a slight narrowing will cause a

diminution in the current, dysuria, and retention, or incontinence. He uses the bulbous bougie in searching for a stricture. The constricting bands are usually found by him at the middle or the upper portion of the urethra, and he has never seen but one stricture at the meatus.

In the examination, as in the treatment, he uses locally a 5 per cent. solution of cocaine. Dr. Herman<sup>63</sup> has had six cases of urethral stricture and could find only twenty-three other reported cases. Among the causes he mentions gonorrhœa, lupus of the vulva, and in the aged, fibrous thickening of the urethra. Herman<sup>64</sup> details also a case of lupus limited to the urethra, and states that this limitation renders it probably unique, as usually when lupus is the cause of urethral stricture, the disease is an extension of vulvar lupus. Dr. Horrock<sup>65</sup> reports two cases of congenital origin, and Dr. Routh<sup>66</sup> gives as the cause in one instance, an anterior parametritis extending downward. Hardon<sup>67</sup> gives as the causes of stricture, gonorrhœa, traumatism as in labor, and the improper use of cauterants. He says the stricture is most frequent about the meatus.

*Treatment.*—Graduated steel sounds are used by Van de Warker, thus effecting not only gradual dilatation but also absorption of the constricting exudate. In strictures of small dimension he resorts to this treatment over a period it may be of several months. To secure the more important result of absorption of the exudation requires a more or less prolonged treatment. Dr. Herman prefers rapid dilatation as simple and successful. Hardon thinks that rapid dilatation and cutting should not be resorted to because of the resulting scar tissue; and that in some instances when the meatus and the urethra near it are much contracted and surrounded with cicatrices, it is better to perform the button-hole operation of Emmet and to leave the fistula permanently open.

#### CATHETERIZATION OF THE URETERS.

Dr. Pawlik<sup>68</sup> has developed this procedure in the female so that its possibility and its value for diagnostic and probably therapeutic purposes are well established. The condition of each kidney may be thus determined, and the indications for or against nephrectomy rendered clear. The method determines which kidney is affected, and may be of therapeutic value as in hydronephrosis,

pyelitis, or ureteritis. Pawlik directs that the bladder should contain about seven ounces (200 cubic centimetres) at the time of the exploration. The orifices of the ureters are then to be found upon a swelling of the form of a convex bow running from the angles of the base of the trigonum toward the urethra. The swelling of the ureter is the most important guide. The patient should be in the lithotomy position, with the perineum retracted so that the anterior wall of the vagina can be seen. The catheter being introduced, it is known that the ureter has been entered by the facts that all resistance ceases, that a slight depression is made on the anterior vaginal wall, that the sinking of the handle of the catheter is resisted and that the instrument can be pushed farther and farther to the side. The catheter can be carried to the pelvis of the kidney unless the ureter is fixed in the pelvis by pathological changes in the connective tissues.

Howard A. Kelly<sup>69</sup> and others have practiced in this country the method of Pawlik, and its great value is undoubted when an operation on the kidney is under consideration, and under other circumstances. It is yet to be seen, however, whether the manipulation is altogether devoid of danger under some circumstances, or when resorted to during the puerperal period, as in an instance reported by Hirst.<sup>70</sup> He mentions no bad results in his case; but certainly during the first few weeks after labor catheterization of the ureters should be resorted to only when strongly indicated. The catheters used are made either of metal or of flexible material.

#### URINARY FISTULÆ.

*Causation.*—Dr. More Madden<sup>71</sup> has found that most of the vesico-vaginal or vesico-uterine fistulæ occur after instrumental labors, and most frequently in multiparæ in whom subinvolution has softened the tissues. Dr. Roe<sup>72</sup> believes that though the forceps have been used in most labors followed by fistulæ, yet the cause of the fistulæ is to be looked for in the prolonged pressure of the head rather than in the resort to instrumental delivery. An additional cause of the greater frequency of fistulæ in multiparæ is to be found in their tedious labors and in the larger heads of their children.

Höhlmann<sup>73</sup> states that of 35 cases treated in the Breslau Clinic for Women, 27 were produced by the pressure of the fœtal

head in contracted pelvis; in two cases the pelvis was normal, but there was hydrocephalus; five cases were due to obstetric operations; one was caused by a calculus. The fistule did not occur more frequently on the left side.

Dr. Prewitt<sup>74</sup> refers to an Illinois physician threatened with a suit in court for damage, because a fistula followed a long labor eventually terminated with the forceps; but Prewitt pronounced the fistule due to sloughing dependent upon the prolonged pressure of the head at the pelvic outlet, and not due to the forceps. Dr. H. P. C. Wilson<sup>75</sup> has never seen a vesico-vaginal fistule caused by the forceps, but believes the accident due to permitting the head to remain too long in the pelvis.

*Preparatory Treatment.*—Dr. Bozeman<sup>76</sup> has devised a contrivance for the carrying away of the urine in cases of fistule without permitting its contact with the mucous membrane. In the treatment of the cicatricial contractions and distortions of the vagina so often accompanying fistulæ involving that canal, Bozeman resorts to incision and removal of portions of the bands and to dilatation with hard and soft dilators. The hard dilators are of different sizes and are either retained within the vagina or are long enough to extend through the vulva when dilatation of the latter is necessary. The soft dilators are made of pieces of sponge and covered with oil silk. In time the vagina may be dilated with these to nearly the size of the fetal head. When the uterus is fixed so that the cervix can not be drawn down and be made to aid in the closure of the fistule, he overcomes the fixation by upward pressure with the dilators referred to and by passive motion secured by means of a hook fastened in the cervix.

For the complications of inflammation, contraction and prolapse of the bladder he resorts to frequent irrigations of the bladder, and secures the obliteration of the folds of the bladder walls by means of dilatation of the vagina.

Contraction of the bladder, he states, is best treated by obturation of the fistule with an oil-silk sponge vaginal dilator, and the consequent gradual distension of the bladder with urine. The prolapsed bladder should be replaced in the knee-chest posture, and its normal position maintained by one of the forms of dilators mentioned. In cases of uretero-vaginal fistule the ureter must first be turned into the bladder, and then the resulting vesico-vaginal



fistule must be closed. If the ureter makes a part of the border of a fistule, the ureter must first be slit up on the vesical surface, otherwise the introduction of sutures will probably cause its occlusion.

Dr. Souchon<sup>77</sup> has reported an instance in which it was necessary to practice dilatation with occasional incisions for seventy days before the fistule could be rendered sufficiently accessible for operation.

Croom<sup>78</sup> emphasizes the importance of treating the complications, prior to operating, by hot vaginal injection for days or weeks, by the careful removal of all phosphatic deposits, and the touching of granulating surfaces with argent. nitrat. The urine should be kept acid by administration of benzoic and boracic acids with the free use of diluents. Get the parts in a healthy condition before operating, cut cicatricial bands and dilate the vagina as needed. The best time for operating is universally recognized to be one week after the menstrual period. Examine for stone.

Tillaux<sup>79</sup> defers operating until after the expiration of three months subsequent to labor, during which time the fistule usually continues to diminish in size. If, however, the general and local conditions seem favorable and the fistule ceases to become smaller, he may operate as early as the end of the first month. An operation done before the puerperal period has entirely passed, usually proves a failure.

Molinier<sup>80</sup> states that renal albuminurics should not be operated on for the cure of urinary fistulæ.

*Operation.*—Since the time of Sims, silver wire has continued the favorite material for suturing fistulæ. Yet there are now not a few operators who are resorting either tentatively or as the result of their experience to other suture material. In the Breslau Clinic silk-worm gut has been used with success in 29 cases out of 35 operated on. In these cases liberating incisions were made into the vaginal mucous membrane when the tension on the suture seemed too great. Prof. Olshausen, of the Berlin University, has not used silver wire for twenty years, and now has adopted the silk-worm gut.

Mr. Tait brought before the British Gynecological Society the method of flap-splitting as applied to the cure of especially button-hole or limited fistulæ. He makes, all around the hole, an incision

parallel with the vesical and vaginal surfaces, and three-eighths of an inch in depth, till the two surfaces are free from each other. He then turns the bladder flaps into the bladder and the vaginal into the vagina and introduces the suture, always of silver wire, from the vaginal surfaces, without penetrating through the vesical membrane, and introduces them in such a manner as to cause the raw surfaces to become opened out and to be accurately applied to each other across the fistule.

Rydygier<sup>81</sup> has operated twenty-one times according to Simon's method with only two failures. In Simon's method both the vaginal and the vesical walls are freshened at nearly right angles to their mucous surfaces. Tillaux adopts the American plan of denuding the vaginal surface around the fistule, and reports a rare case of urethro-vaginal fistule thus cured. He removes in such a case sufficient tissue to expose the vaginal surface of the urethral mucous membrane. He uses cocaine locally until the tissues are stone color, deeming ether unnecessary. He uses the catheter every six hours and removes the sutures on the sixth day.

Wölfier<sup>82</sup> in cases of urethro-vaginal fistule with impermeability of the urethra, resects the **two** ends of the urethra and unites them with sutures as in resection of the intestines.

Jeannet<sup>83</sup> reports several operations performed by producing an eschar about the fistule with the actual cautery and waiting for about two weeks until after the eschar has dropped off, when he scrapes off the granulations with the sharp curette and introduces sutures. His failures are so numerous that so irrational a method of operating should be entirely discarded. Molinier speaks favorably of the cautery as an application to small fistulous openings left after operations.

W. Duncan<sup>84</sup> reports a case of extensive vesico-vaginal and also extensive recto-vaginal fistule in the same patient, due to sloughing after a very difficult and prolonged labor. He first closed the vesico-vaginal opening by transplanting a flap from the lower vagina and from the inner surface of the labium. He first raised the flap but left its upper and lower borders attached for eighteen days, keeping carbolized lint packed under the flap. He now freshened the borders of the fistule, and, detaching the lower end of the flap, secured the latter, duly freshened, to the borders of the fistule. The result was an almost entire closure of the opening into the

bladder. About one year afterward he operated in a similar manner on the recto-vaginal fistule with entire success.

Dr. Duncan dwells upon the importance of leaving such flap attached by two borders for two or more weeks with the view of insuring the necessary degree of vitality of the flap when utilized in the closure of the fistule. He rightly claims that such flap operations are very much more satisfactory than the closure of the vagina, though more delicate of performance.

More Madden<sup>85</sup> calls attention to the liability of the patient dying with renal disease after closure of the vaginal outlet for cases of very large urinary fistulæ.

Folet<sup>86</sup> reports a new method of operation for the closure of a utero-vesical fistule. Under anæsthesia the urethra was so dilated as to permit the introduction of the finger into the bladder. The uterus was then drawn to the vaginal orifice with toothed forceps, and an incision was made through the vagina in front of the uterus, as in the operation for removal of the uterus. With the finger in the bladder, the fistule was now exposed and was easily sutured with catgut. The uterus was replaced and the vagina tamponed with iodoform gauze and a cure promptly secured. Verneuil claims that most cases of cervico-vesical fistule can be cured by freshening and suturing after lateral splitting of the uterine cervix.

Dr. Rose,<sup>87</sup> of Zurich, in a case of vesico-vaginal fistule, performed the operation of closing the vaginal canal, making a recto-vaginal fistule, and securing the patulency of the latter by daily introducing the finger.

M. Hervieux<sup>88</sup> has cured an old vesico-vaginal fistule with daily injection on to the fistulous borders of Labarraque's solution of chlorinated soda; and Dr. Michinard<sup>89</sup> has cured two such fistulæ with a few applications of solid argent. nitrate at intervals of three or four days, the patients being permitted to walk about and to urinate at will during this treatment.

*After-treatment.*—Usually absolute recumbency is insisted upon, and generally the bladder is emptied, with the catheter either being left in the bladder or introduced every five or six hours. Often the self-retaining catheters cause vesical irritation and tenesmus, and should then be left out. Repletion of the bladder should be avoided and also spontaneous evacuation and tenesmus. Many of

the German operators now tampon the vagina with iodoform gauze, after the operation, with occasional antiseptic vaginal injections. The bladder and the vagina should be rendered aseptic prior to operating.

#### VAGINAL URETHROCELE.

M. Chéron<sup>m</sup> defines a urethrocele as a diverticulum of the urethra receiving urine during ordinary micturition and retaining it until it escapes while standing or through later efforts. To this it may be added that in some instances the urethrocele is not entirely emptied unless the patient renders assistance by means of pressing with the finger introduced into the vagina. Chéron divides urethroceles into two varieties: (1) When there is simple localized dilatation of the urethra. This variety he pronounces of

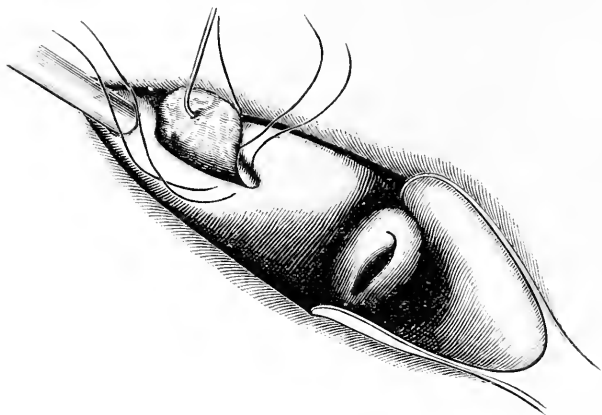


FIG. 8.—EMMET'S BUTTON-HOLE OPERATION.—(*Emmet's Principles and Practice of Gynecology.*)

most infrequent occurrence; (2) and the most numerous, when there is a urinary pouch communicating with a urethra of normal calibre by an orifice relatively narrow. As to the pathogenesis of the latter variety, three opinions have been advanced:—First, it is congenital. Chéron states that this is improbable in most instances. Second, the condition is determined by a limited tearing of the urethra during labor, and the escape of a few drops of urine into the peri-urethral tissue, with the gradual formation of a urethrocele. Finally, the urethrocele is due to a narrow opening occurring between the urethra and a deep cyst of the anterior vaginal wall. In a urinary pouch thus produced, calculi are liable to form.

*Treatment.*—Chéron in cases of urethrocele dependent upon an opening occurring between a vaginal cyst and the urethra, slit:

up the urethra from the orifice of communication to the meatus, and prevents reunion of the lips of the incision. He states that after cicatrization is established, urination is normal and any associated urethritis disappears.

Emmet's button-hole operation,<sup>91</sup> of which figure 8, taken from his work, is illustrative, would seem well adapted to the relief of urethrocele, even if produced by a vaginal cyst opening into the urethra. It leaves the urethra so nearly in its normal condition that it should be preferred to Chéron's plan of slitting up the urethra. Or an operation as indicated in figure 9 may be performed if there is great redundancy of the anterior vaginal wall.

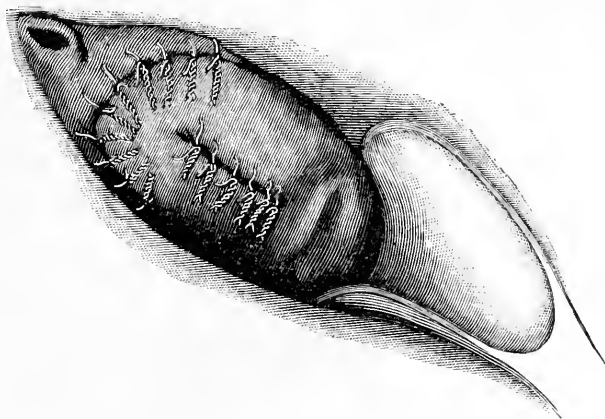


FIG. 9.—EMMET'S OPERATION FOR URETHROCELE AND CYSTOCELE.—(*Emmet's Principles and Practice of Gynecology.*)

#### VESICAL CALCULUS IN THE FEMALE.

Croom<sup>92</sup> recommends for the removal of stones smaller than the tip of the finger from the female bladder the procedure delineated in fig. 10. Calculi can be thus easily brought down from the bladder into the urethra and pushed along one by one until the meatus is reached, when they can be expelled without difficulty, if sufficiently small. If the stone is larger than the size indicated, this method of removal must not be attempted, as it would then be dangerous and liable to occasion permanent incontinence. The size of the stone can be approximated by a careful bimanual examination. Croom further says that with a soft stone of moderate size and soft, lithotripsy is most feasible; but if it is hard or of large size, he recommends vaginal lithotomy. If there is cystitis as a complication the opening is to be kept patulous until the cystitis disappears.

M. Chéron<sup>93</sup> calls attention to the formation of calculi in a diverticulum of the urethra. Such stones arise primarily in this diverticulum, and give rise to urethritis with incontinence or frequent urination. Even small stones may remain in this diverticulum unexpelled until they reach a large size.

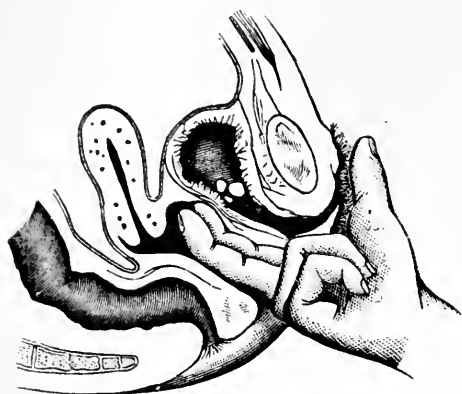


FIG. 10.—CROOM'S PROCEDURE.—(*Medical Register.*)

bodies may be readily sucked out of the bladder with apparently great facility.

Dr. De F. Willard<sup>94</sup> exhibited before the Philadelphia County Medical Society a "sucker,"—an apparatus by means of which small stones and foreign

#### REFERENCES.

1. Cent. f. Gyn. 2. Jour de Méd. de Paris. 3. Polyclinic. 4. Brit. Gyn. Jour.
5. Gaz. des Hôpitaux. 6. Cinn. Lancet-Clinic. 7. Med. Register. 8. London Med. Rec.
9. Cent. f. Gyn. 10. Zeit. f. Geburtsh. u. Gyn. 11. Brit. Med. Jour. 12. Med. and Surg. Rep.
13. Jour. Akusherstva. 19. Dublin Jour. Med. Sci. 20. Brit. Gyn. Jour.
21. Gaz. de Gyn. 22. General and Operative Gynecology. 23. Rest and Pain.
24. Dublin Jour. Med. Sci. 25. Brit. Gyn. Jour. 26. Gaz. de Gyn. 27. Med. Register.
28. Winckel, Diseases of Women. 29. Am. System of Gynecology. 30. Pepper's System of Medicine.
31. Maryland Med. Jour. 32. New Orleans M. and S. Jour. 33. Med. Chronicle. 34. Med. and Surg. Rep.
35. Diseases of the Vagina. 36. Gaz. des Hôpitaux. 37. La Semaine Méd. 38. Brit. Med. Jour.
39. Maryland Med. Jour. 40. Albany Med. Annals. 41. Maryland Med. Jour. 42. Med. Chronicle.
43. Brit. Med. Jour. 44. Med. and Surg. Rep. 45. Gynecological Operations. 46. Diseases of the Vagina.
47. Edinburgh Med. Jour. 48. Coll. and Clin. Rec. 49. Med. Register. 50. Med Register.
51. Gaz. des Hôpitaux. 52. Brit. Gyn. Jour. 53. N. Y. Med. Jour. 54. Cent. f. Gyn. 55. Cent. f. Gyn., 1886.
56. Brit. Gyn. Jour. 57. Gyn. Operations. 58. Obstetric Gaz. 59. Daniel's Texas Med. Jour.
60. Virchow's Arch. 61. Gaz. des Hôpitaux. 62. Med. News. 63. Lancet. 64. Med. Press and Circular.
65. Lancet. 66. Lancet. 67. Atlanta Med. and Surg. Jour. 68. Wien. Med. Presse. 69. Med. News. 70. Med. and Surg. Rep.
71. Lancet. 72. Lancet. 73. Cent. f. Gyn. 74. Am. Med. Digest. 75. Maryland Med. Jour.
76. Med. News. 77. New Orleans M. and S. Jour. 78. Med. Register. 79. Le Praticien.
80. Revue Méd. 81. Ann. de Gyn. 82. La Semaine Méd. 83. Revue Méd.
84. Brit. Med. Jour. 85. Lancet. 86. Cent. f. Gyn. 87. Gaz. Médicale. 88. Gaz. des Hôpitaux.
89. New Orleans M. and S. Jour. 90. Gaz. des Hôpitaux. 91. Emmet's Principles and Practice of Gynecology. 92. Med. Register.
93. Gaz. des Hôpitaux. 94. Trans. Phila. Co. Med. Soc.

[Undated references apply to journals published in 1887, and original articles can be found by consulting the indexes of the respective publications.]

# STERILITY: PREGNANCY· DISORDERS OF PREGNANCY.

By THEOPHILUS PARVIN, M.D.,

PHILADELPHIA.

---

## STERILITY.

DR. GRAILY HEWITT<sup>1</sup> reports thirty cases of sterility which presented uterine flexions or versions, and which were cured by remedying the displacement. The principle of treatment which was adopted was to improve the patency of the cervical canal by straightening it, and the method of increasing this patency which was employed was the elevation of the fundus by a suitable pessary. A stem pessary was used in two of the cases, and in several of them the uterine sound was employed as an assistance to the pessary in unfolding the flexion, and thus increasing the cervical patency; in only two was dilatation of the cervix systematically carried out, and in these the dilatation was only made to a slight extent, and not so fully as has been adopted by practitioners of repute during the last three or four years. These cases were treated some years ago, and Dr. Hewitt believes that if he had resorted more freely to dilatation, he would have been able to present a larger series of successes in the cure of sterility.

In "Notes on Sterility," by Dr. James Oliver,<sup>2</sup> the author refers to the fact that in some instances "sexual incompatibility" is the cause of sterile marriages; or in other words, a change of partners may be followed by fertility. He states that one of his patients was married fifteen years to a healthy man without ever becoming pregnant; but after her husband's death she married again, and within a year, though forty years old, became pregnant. Dr. Oliver believes that, taking all the facts into consideration, there can be no doubt that the higher education of women is detrimental to the race, tending as it inevitably must, to engender a state of sterility, or, what is worse, to produce a race with marked evidences of

physical and mental enfeeblement. There are some well-known historical instances of so-called sexual incompatibility, *e.g.*, Josephine was fertile in her first marriage, but sterile when married to Napoleon. We doubt whether the higher education of women has the deplorable results attributed to it by Dr. Oliver. At least the experiment is too recent and too limited to justify his deductions.

Dr. T. J. Beattie<sup>3</sup> reports two cases of sterile women, also suffering from dysmenorrhœa, who were successfully treated by bilateral incision of the cervical walls. One of these patients had acquired sterility, while the other had never borne a child.

In a paper upon the Causes and Treatment of Barrenness, by Dr. T. More Madden,<sup>4</sup> presented to the last International Medical Congress, the author states that stenosis of the cervical canal was the most frequent cause of sterility. The essential feature of his method of treating such cases was the separation by cutting and simultaneous forcible expansion of the affected parts, followed by dilatation of the canal during cicatrization, so as to prevent their subsequent contraction, and thus secure permanent patency.

Dr. James Davies<sup>5</sup> states that the Druidic College of the twelfth century considered tannin as the most potent of all natural products in causing sterility, and that tea-drinking as practiced by the public undoubtedly acts in the same way. Sulphur, too, has been thought to prevent childbearing, and probably the facts proving this are as well established as those that are adduced in favor of such result from tea-drinking. On the other hand, Dr. J. Harris Jones<sup>6</sup> regards belladonna given internally as in many cases curing sterility. The doctor states that he will not theorize upon its action, but will merely mention that he has observed that the external genitals become somewhat relaxed, and the os and cervix uteri somewhat softened and pliable during the treatment.

The etiology and treatment of female sterility is considered by Dr. A. Calkins,<sup>7</sup> of Bath, Mich. The author in referring to the causes of infertility in women, mentions hypertrophy, and displacements of the uterus, lacerations of the cervix, etc. He states that a large per cent. of the cases of barrenness can be attributed to induced abortion. He holds that spasmodic dysmenorrhœa is found to be a symptom in two out of five cases of sterility. "If this is found to be of reflex origin, the original cause must be dis-



covered and remedied. This cause is usually an irritation of the uterine nerves from a stasis of the blood in the uterine veins,—the result of an unequal circulation. Electricity seems to be the one agent that can equalize the vascular supply.” We are glad to find a doctor who does not at once declare such cases must be treated by dilating or incising the cervix, but who recognizes the value of electricity; for assuredly many of these patients can be thus cured.

Sebankow<sup>8</sup> has given the results of his investigation as to the influence on the fertility of married women caused by the long temporary absence of their husbands. A considerable portion of the population in certain Russian provinces are absent during the summer at work. Women whose husbands did not go away averaged 9.2 children, while those whose husbands were temporarily absent, had only 5.2 children. The causes of this relative sterility of the latter class are, the women have to work harder during the absence of their husbands, and thus liability to uterine disease and abortion, and also amenorrhœa may result; the suspension of sexual congress for a long period; and the fact that the men become infected with syphilis during their absence.

Kisch<sup>9</sup> in his work upon the Sterility of Women, makes the following remark which will be cheerfully accepted by all who are not blind devotees of the mechanical theory of uterine diseases: “Sims’ assertion that the cure of sterility can only be accomplished by surgical interference is untenable. The principal factor is a medication which raises the nutrition of the entire organism, improves the blood-formation and favors the resorption of pathological products in the sexual organs. For in a large majority of cases presented for treatment we have to deal with anæmia, chlorosis, and scrofulosis. Local alterations in the parts of course require their rectification, such as the various forms of flexion and version. Occasionally surgical interference is called for in cases of abnormal conditions of the hymen, or of abnormal communications between the vagina and neighboring organs, or, finally, on account of neoplasms.”

#### FERTILITY.

*Relation between the Ages of Husband and Wife, and the Production of Sex.*—Hofacker and Sadler, working independently

of each other, arrived at about the same conclusions as to the relations between the ages of the parents and the sexes of the children. These conclusions, commonly known as the Hofacker-Sadler law, are as follow: If the husband is younger than the wife, or if they are the same age, the number of female births predominates, the proportion, according to Hofacker, being 100 females to 90 males. But if the husbands are older than the wives, male births predominate; and the excess increases with the increase in the difference of age.

It is more than half a century since these researches were made, and the law is often quoted as final. But Bertillon, in his elaborate article upon *Natalité*, *Dictionnaire Encyclopédique des Sciences Médicales*, has shown that the statistics of birth both of Norway and Sweden invalidate some of the conclusions. Thus the Norwegian statistics show, disregarding the ages of the husbands and wives, that in the first six years of married life the relation between male and female births is 116.3 to 100; but after the twelfth year of married life the proportion changes so that to each 100 girls born there are only 94.4 boys. Swedish statistics show that the proportion of male and female births varies according to classes of society. Thus in noble families for every 100 girls there are 98.3 boys; but in the clergy for each 100 girls there are 108.6 boys; and in agriculturists 105.7. Bertillon concludes from his study of the question that the influence of the ages of the parents, if it exists, may be neutralized by the qualities inherent in the social classes to which these parents belong, and this independently of the relations of age which exist between the married.

Professor Kisch<sup>10</sup> has studied 556 marriages of reigning families and of the aristocracy in reference to the number of male and of female births. There were 1932 children born in these families, the proportion of male births being 107.7. This proportion varies with the increase of age of the fathers; thus where the husbands were from 1 year to 5 years older, it was 103.8, but if 16 years or more it was 122.1. If the parents were the same age the proportion sunk to 80.9, there being only 34 boys born, and 42 girls. When the wife was older than the husband, there were 40 male, and 38 female births. A curious fact observed by him was when the wife was from 15 to 20 years of age, the husband being older, the number of girls born slightly predominated; but

if she was from 20 to 25 years old, the male births became the greater in number.

But little importance can be attached to Professor Kisch's investigation from the very small number of cases he has considered.

*Procreation of the Sexes.*—It is claimed<sup>11</sup> that the result of procreation before midnight will be male, but if it occurs in the morning the child will be a female. According to Fürst,<sup>12</sup> there is an excess of male children begotten in the four or five days immediately following menstruation, but of female in the subsequent period.

*Predicting Sex.*—One of our American medical journals has a communication from a physician of large experience who claims that he has, from the position which the child occupies in the womb, been able for the last few years accurately to predict the sex, only one failure having occurred. Thus, if the child occupies the right side of the womb, it is a boy; but if the left, a girl.

How often old faiths are regenerated, and the errors of past ages claimed to be the knowledge of the present! Hippocrates taught the same thing that our contemporary believes he has learned from his own observation. And now we shall expect some one shortly to declare as something new the Hippocratic method of determining the sex in advance. Thus, if a boy is desired, tie up the left testicle prior to intercourse; but if a girl, let the right testicle be similarly treated.

#### PREGNANCY.

*The Influence of "Maternal Impressions upon the Fœtus."*—This old but unsettled question was the subject of a very interesting paper by Dr. Fordyce Barker.<sup>13</sup> The author adduces some remarkable cases, occurring under his own observation, showing the influence of impressions made upon the mother affecting the fœtus in utero. He asserts, after quoting several authors who reject this belief, that the weight of authority must be conceded to be in favor of the doctrine that maternal impressions may affect the development, form, and character of the fœtus. He regards the subject as having been obscured by the tendency to restrict the term "maternal impressions" to purely emotional causes, and that it really includes those which have a physical as well as a psychical

origin. He admits that we have no scientific explanation of the facts which establish the belief in such influences. The paper at the time it was presented to the Society was very ably discussed by Dr. Busey, of Washington, who adduced a large number of cases sustaining the thesis presented by Dr. Barker.

Dr. Busey divides all the cases of "Maternal Impressions" into four classes: (1) Those which may be explained as coincidences. "If there were no others, the theory might be discarded." (2) Those in which there were a maternal impression and foetal blemish or deformity, with absence of correspondence. (3) Cases in which there is no previous mental impression or conviction, but correspondence between an observation and foetal deformity: the mother had no shock, and no anxiety in regard to a possible deformity of her child, but observed an object, and the child is born with a deformity corresponding with the observation. (4) This class embraces cases of correspondence between the maternal impression and the deformity." After adducing several cases belonging to the last class, Dr. Busey remarks: "My credulity will not permit me to accept the doctrine of chance or coincidence in explanation of the correspondence between the maternal impressions and the foetal deformities in this group of cases. Upon the common doctrine of chance, the coincidence is too remarkable to be explained so readily; and if one is suggestive, a second adds great weight, and a third is almost conclusive."

On the other hand, Dr. Emanuel Frank<sup>14</sup> has the utmost incredulity. His article is in good degree a criticism of views recently expressed by Dr. Exner, Professor of Physiology in the University of Vienna, which indicated a belief in the doctrine to some degree. Exner adduced the following fact: Having experimented upon a pregnant bitch, the experiment involving opening the skull anteriorly, the animal at term gave birth to two pups, one of which presented upon the head a cicatrix corresponding in position and general appearance with that upon the mother's head. Frankel jestingly says that in order to prove "the Versehen," we must suppose that the bitch had an opportunity of looking in a glass, and there saw the wound upon her head, and hence this visual image affected her offspring. Now, it may be answered to this that the person may derive from general sensation and from touch the gross character and the location of a wound with almost

if not quite as much clearness as if he actually saw it. Further, we all know how acute and discriminating the sense of touch in the blind has become by culture. And is it not possible that in an animal as intelligent as the dog, not possessing in its kennel any mirror in which it can note its personal appearance, may have more than common development of the sense of touch, exercising which it obtains information as reliable as that which is given by vision? Admitting the fact of maternal impressions, we utterly fail of an explanation as to how the effects are produced, most of those hitherto proposed scarcely deserving to rank as high even as guesses at truth. Meantime let the honest record of facts go on, not rejecting them as fictions because the nexus between cause and effect eludes our vision, and a future with vastly larger knowledge of physiology and psychology may plainly read the mysteries hidden from our eyes.

*Blue Color of the Vagina as indicating Pregnancy.*—The peculiar color of the vagina as indicating pregnancy in its early weeks has been presented by Dr. Chadwick<sup>15</sup> in a well-known contribution. More recently Dr. Farlow has made a study of 141 cases of pregnancy in regard to this diagnostic mark, and his results are as follow: it was characteristic in 70, suggestive in 35, and absent in 36. The author remarks that he also found in four cases the peculiar color: in one of the four it was quite characteristic, in the other three only almost characteristic. Yet the women were not pregnant!

While such investigations can be made in dispensary practice, they cannot be employed as a rule by the private practitioner, and hence no great value will be attached to this sign by him. It is only exceptionally that he will have the opportunity of seeking it, and only exceptionally, too, is it important that he should seek for it.

*Superfoetation.*—Godfrey<sup>16</sup> reports a case of so-called superfoetation. The facts are these: A woman expelled a three months' foetus, and four days afterward another foetus having apparently the development belonging to at least seven months. But it is plain that the proof of impregnation of that first expelled having taken place three months and a half subsequently to the impregnation of the first is not given. Instead of accepting the very improbable hypothesis that an ovule was fecundated so long after

the uterus was occupied by a growing fetus, it would be more rational to suppose that fecundation of two ovules occurred simultaneously or successively, and one ovule perished at three months and a half.

*Superfecundation.*—Dr. Nowlin,<sup>17</sup> of Nashville, reports the case of a married negress who was delivered of twins, one black, and the other a mulatto. The woman acknowledged having had intercourse with her husband one day and with a white man the following day.

Dr. Kendall reported at the last meeting of the Texas State Medical Association, a similar case. The doctor in his report stated that both “father and mother are full-blooded, jet black Africans,” but gave no explanation of the difference in color of the two children.

#### DISORDERS OF PREGNANCY.

*The Nausea and Vomiting of Pregnancy.*—Notwithstanding the frequency of the vomiting of pregnancy, its often greatly distressing character in many cases, and its imminent danger, we find but few recent contributions to the etiology of the disorder and to its therapeutics. In regard to the former, in an article by Veit,<sup>18</sup> to which we shall more fully refer under another head, the author takes the ground that some of the cases of obstinate vomiting in pregnancy are caused by endometritis. The hypothesis is probable, but it is sustained by too few cases for immediate acceptance. On the other hand, how very many instances of severe vomiting in pregnancy occur when endometritis is not present!

Higgins<sup>19</sup> proposes a new theory as to the cause and treatment of vomiting in pregnancy. It certainly would be a great step in advance if this affection, which most obstetricians have regarded as dependent not upon one, but upon many causes, could be so simplified as the author proposes. If we understand the author, this cause is sexual intercourse, the husband too eager for it, and the wife too averse. He observes: “After thirty-seven years of active practice I have the first person to prescribe for who was abundantly able to satisfy the desires of a weaker husband.” In the treatment he stimulates the passions with appropriate remedies and requires rest from the desires of the husband. For the former purpose he advises 25 drops three times a day of a mixture of equal parts of tincture of cantharides and the muriated tincture of iron given to the wife.

We look upon this hypothesis as to etiology as having some element of truth. There can be no question that sexual intercourse in pregnancy has in many cases a most pernicious influence upon gastric irritability; but to make it the sole cause is utterly antagonistic to sound reasoning and well-known facts. Further, he has little respect for a pregnant woman's kidneys—organs that in so many instances give way under the pregnant condition so that in some instances a fatal nephritis may occur—who gives her cantharides. Even if there were no peril from this cause resulting from the treatment, it might be questioned whether stimulating sexual passion, so that a wife may gratify selfish, blind, and worse than beastly lust on the part of the husband, is one of the functions of the physician under such circumstances? Finally, admitting this etiology in some cases of vomiting in pregnancy, would it not be far better to teach the husband reverence for his pregnant wife, a higher love, and a manly self-control. Nature protects females of the animal race during gestation from sexual congress, and enlightened reason and quickened conscience ought to give similar protection to the human female during pregnancy. It was a famous woman of ancient Rome, notorious for her dissolute character, who, when reminded of the conduct of animals in this regard, ambiguously replied, "Oh, it is because they are beasts!"

"Unless above himself he can  
Erect himself, how poor a thing is man!"

At least let him not descend below the level of four-footed beasts!

Dordain<sup>20</sup> reports a case of incoercible vomiting, the patient four months and a half pregnant, successfully treated by having her lie in bed upon the back, and by taking granules of hyoscyamine, sulphate of strychnia, hydrochlorate of morphia, and quassine. The cure was effected in seventeen days.

There is no great value attached to this "cure," for patients so frequently are relieved, whether anything or nothing has been done, the disorder ceasing suddenly it may be, that a recovery in seventeen days with the administration of so many drugs may have been simply a sequence, not the effect of the treatment.

Another case of this disorder under the care of Bruniche, was cured through feeding by means of an œsophageal tube.

Chazan<sup>21</sup> reported to the Society of Gynecology of Dresden, two cases of obstinate vomiting in pregnancy. One of these was

apparently dependent upon retroflexion of the uterus, and after the organ was restored to its normal position, and a ring pessary introduced, the vomiting ceased. It is needless to state that many similar cases, in which the disorder was the result of positional disorder of the uterus, have been immediately cured by rectifying the displacement. Chazan's second case was one in which strongly fixing the attention of the patient caused temporary cessation of the vomiting. Subsequently, the disorder persisting, an examination was made while the patient was under the influence of chloroform, and after this examination the vomiting permanently disappeared. Afterward it was learned that the woman believed the ovum had been removed during her anæsthesia.

The result in this case led Chazan to the very probable hypothesis that in many cases of the disease it is dependent upon a general malady of the nervous system, or upon psychical disorders, and not the result of an anomaly of the genital organs. This hypothesis embodies more truth than many of those which have been suggested in explanation of the obstinate vomiting of pregnancy, and suggests that regard for the general condition of these patients is all-important, and that frequently a profound mental impression may be more efficient than any of the alleged specifics for the disorder.

Dr. G. M. Lewis, of Vernon, N.Y., reports a case of the disease successfully treated chiefly by calomel and santonine, after other treatment had failed, this treatment including Copeman's dilatation of the cervix. In addition, the patient had hypodermic morphia, rectal injections of acidulated and peptonized strong beef tea, and was confined to the horizontal position. The reporter attributes the favorable result to the calomel and the morphia. But we must also regard the general rest of the body and rest for the stomach as factors.

Dr. J. Frec.<sup>22</sup> if there be constipation, advises a cathartic of calomel, ipecacuanha, and "perhaps gamboge enough to thoroughly evacuate the intestines, and if it be necessary, an enema given daily to sustain the effects." In addition he speaks very favorably of a mixture of bicarbonate of soda, dilute hydrocyanic acid, syrup of lactopeptine, of each in order being about four grains, one drop, and a teaspoonful: the dose of the mixture is one teaspoonful given half an hour before a meal. The quantity



of hydrocyanic acid seems small, and given in conjunction with subnitrate of bismuth, it probably would be as efficient as with soda.

The valerianate of Cerium<sup>23</sup> has been recommended as a substitute for the oxalate, first proposed and employed by the late Sir James Y. Simpson, the objection to the latter salt being that it is rarely pure, but contains iron, etc. It is asserted that this new salt administered in pills of 0.05c., two to four a day, arrests in a short time the most obstinate vomiting, and especially those that have their origin in a functional modification, or organic lesion of the uterus or of the utero-ovarian apparatus,—pregnancy, dysmenorrhœa, acute metritis, metro-peritonitis, etc. The promise is a little too liberal for general belief.

Cocaine has new proofs of its value. It has been applied locally with extract of belladonna, one grain of the former to six drachms of the latter, to the neck of the womb morning and evening, and the result has been very satisfactory in Dr. Fenn's<sup>24</sup> hands. But the quantity of the medicine absorbed would be very small when this mixture is used, and it is not easy to determine how much of the benefit is to be attributed to cocaine and how much to the belladonna. The same remark applies in part to an application advised by Bois,<sup>25</sup> composed of one centigram of cocaine and fifty grams of vaseline, which is made to the neck of the womb night and morning. Fraipont recommends hypodermic injection of Pravaz's syringe of a 4 per cent. solution, while others recommend a 5 per cent. solution in ten to thirty drop doses.

A case of the disease is reported<sup>26</sup> which had resisted numerous other means, cured by a mixture of deliquescent phenic acid and black drop, one part of the former to three of the latter: four drops of the mixture were given in a little sweetened water three times a day, five or ten minutes before a meal.

Probably the most important addition to the therapeutics of the obstinate vomiting of pregnancy is cocaine either given by mouth or by hypodermic injection. We question whether its local application—that is to the neck of the womb—is really of any value.

*Cause of Morning Sickness in Pregnancy.*—Dr. James Oliver<sup>27</sup> regards all theories of the nausea and vomiting of pregnancy

as too speculative, and he proposes one suggested by evolution, which we think our readers will regard as quite as speculative as any one of its predecessors. The author states that from the earliest period of existence every organism has been endowed with two distinct qualifications: (1) that of maintaining itself; (2) that of perpetuating its species. At first the double function was performed by a uniform mass, free from any semblance of structural differentiation. Habitual localization of function, however, produces eventually a specialization of structure, and with it the evolution of a nerve tract whereby the interdependence is maintained. It is therefore feasible to suppose that the nerve centre which regulates the process of assimilation is either in apposition or at least in direct communication with that which presides over the organs of generation. All the functions are now performed automatically, and are regulated by nerve centres located in the medulla oblongata, the functions, by inference, being no exception. Considering the close relations that exist throughout life between the two processes of assimilation and reproduction, there can be no doubt that the representative nerve centres act and react upon each other. When the uterus becomes the nidus for a developing germinal mass, the molecular disturbances radiated therefrom to the reproductive centre are liable to be transmitted to the pneumogastric as well, and induce either a feeling of nausea or actual emesis. Usually, however, in the course of a few months, through habit, the pneumogastric centre becomes tolerant, and symptoms evidencing disturbance disappear.

Such is Dr. Oliver's explanation of the cause of morning sickness of pregnancy. But we do not see that the theory of evolution is necessary. The whole explanation may be given whether that is true or false, and its introduction only serves to complicate instead of simplify. Further, the alleged cause of the disorder does not explain the variable time of the appearance of the latter, nor the varying intensity. In some it comes almost immediately after conception, in others not until some weeks subsequently; in some it is a trifling indisposition, and in others a grave disorder. It does not make clear the promptness of action of certain remedial means in some cases, *e.g.*, correcting a displacement of the uterus may immediately arrest the disorder. Finally, the usual cessation of the nausea and vomiting at a certain period

of pregnancy attributed by the author to tolerance through habit, of the pneumogastric nerve, is not in accordance with what is usually observed in nerve function. Response to an irritation does not beget indifference to an irritant, but rather functional activity. We fear this ingenious explanation of the nausea and vomiting of pregnancy must go the way of many preceding ones, and that the profession will still hold that the disorder does not result from one, but from many causes; and this general belief is strengthened by the fact that different remedies have been followed in different cases with beneficial results.

*Incoercible Vomiting independent of Pregnancy.*—Dr. Boissarie<sup>28</sup> reports the case of a married woman, 37 years of age, married for five years, but who had never given birth to a child, who had suffered from obstinate vomiting for two months. Three dilations of the cervical canal with the index finger cured the vomiting. The author frankly states that she was a neuropathic, and had suffered from numerous attacks of hysteria.

#### PREGNANCY AND DISEASE.

*Endometritis during Pregnancy.*—Veit<sup>29</sup> has lately published some very interesting investigations in regard to endometritis in pregnant women, and has classified the clinical manifestations of this affection. Thus, one of the most common of these manifestations is abortion, and especially successive abortions at a fixed time, showing, as it were, that the inflammatory affection requires of the endometrium a certain time for its evolution.

Another of the phenomena of endometritis is hydrorrhœa, and a third is obstinate vomiting. He insists upon this disorder having as one of its causes a lesion of the uterine mucous membrane.

A practical point of considerable importance which he presents is, that if the ovum is diseased, it is not wise to try to prevent an abortion. After miscarriage, the endometritis is to be treated, in addition to suitable general remedies, by local means; and he mentions in confirmation of the value of the latter, that in six cases of women that habitually aborted, these women—having had from three to five miscarriages—were cured of the endometritis, and then gave birth to healthy children.

*The Relations of Cardiopathia and Pregnancy.*—The question

of marriage by women suffering with diseases of the heart is a very important one, and a recent consideration of it by Jaccoud,<sup>30</sup> in which he takes opposite ground, in part at least, to that held by Peter, who has asserted that a cardiopathic should not marry, is of interest.

In considering the subject he first asks, "Has the patient suffered from the cardiac lesion? If she has never suffered, I see no reason to forbid marriage. But," he adds, "her social condition is also to be considered. Thus, if she has to work during pregnancy, there is much to be feared; but if she can be properly cared for, follow medical advice, and pass the last half of pregnancy in almost absolute rest, she may marry.

"If the woman has had a systolic accident before marriage, it is quite probable that when pregnancy occurs these accidents will recur about the fourth or fifth month. But what are these accidents? If only œdema and palpitation, they are not grave. On the other hand, if there should be hæmoptysis, dyspnœa, and especially conjoined with these albuminuria, the case is different. These accidents are almost inevitable about the fourth month of pregnancy, and if they continue, it is doubtful if the patient survives. In such a patient marriage should be forbidden."

While attention has been chiefly given to mitral lesions, aortic are quite as grave; but the accidents from the latter to be especially feared are cerebral, and the pregnant woman may perish from syncope. Jaccoud, in regard to the cases of aortic lesion in addition to urging the importance of knowing the previous manifestations, also claims "the aspirations" of the party are to be considered; and he cites an instance from his private practice of a girl who for eighteen months had ardently desired to marry. If he had given her a negative answer, a mortal syncope might have followed. We utterly reject such an argument in favor of allowing a cardiopathic to marry. Marriage is neither paradise nor hospital. It is not a condition free from grave, sometimes sudden, trials of body and of mind, and the feared syncope is even more likely to occur after entering the marriage relation than from its refusal; and for our part we greatly prefer adopting the rule formulated by Peter than to accept the teaching of Jaccoud.

*Typhoid Fever in Pregnancy.*—Dr. Hirst<sup>31</sup> reported the case of a primigravida who was admitted to the Philadelphia Hospital

in the second week of an attack of typhoid fever. The disease presented all the characteristic symptoms in a typical manner, leaving no doubt as to the diagnosis. On the tenth day after her admission she gave birth to a child which corresponded in its development to the seventh month of intrauterine life. The infant died two weeks after birth, but, unfortunately, the cause of death was not ascertained. One interesting feature in the case was the effect of labor upon the temperature. As uterine contractions began the woman's temperature was  $104.2^{\circ}$ ; but it steadily lowered as labor advanced, until directly after the expulsion of the child it was only  $95^{\circ}$ . Under the influence of external heat and stimulants hypodermically the patient reacted and made a good recovery.

*Typhoid Fever complicating Pregnancy.*—Dr. Aikins<sup>32</sup> reports the following case: "E. C., unmarried, aged 20, was admitted to the lying-in department of the general hospital with commencing labor-pains which terminated in the delivery of a fetus, apparently near or at full term. Severe post-partum hæmorrhage followed, and, notwithstanding all efforts to cause complete uterine contractions, that organ failed to respond, and remained during life in a flaccid condition. After delivery, and some time prior to the patient's demise, the temperature was taken, and found to be  $106^{\circ}$ . The autopsy proved that the patient was suffering from typhoid fever." The writer fails to tell how soon after delivery death followed, and also as to whether the fetus was still-born,—two matters of interest, if not of importance.

*Cold Baths in Typhoid Fever in Pregnant Women.*—Dr. E. Vincent<sup>33</sup> gives several cases in which cold baths with benefit and without any injury were given to women whose pregnancy was complicated with typhoid fever.

Another number of the journal in which the above is reported speaks very favorably of antipyrine given to similar cases. Dr. Clement claims that this remedy is not injurious given in pregnancy, and prefers it to the cold bath for reducing the temperature.

*Purpura Hæmorrhagica complicating Pregnancy.*—Philips<sup>34</sup> presents the following conclusions: (1) Purpura hæmorrhagica occurring during pregnancy partakes partly of the vascular and partly of the neurotic type. (2) The disease has a decided action on the gravid uterus, being almost certainly productive of abortion, and hence, the induction of labor in these cases need hardly be

entertained. (3) The prognosis is extremely grave in these conditions, death taking place in consequence of intra-uterine or of post-partum hæmorrhage. (4) After the seventh month the risk of the child's life is not necessarily greater than in artificial induction, nor does the mother's disorder descend to her offspring. (5) Treatment is unsatisfactory, but at the same time ergot and the faradic current appear to be of some value as curative agents.

*Cholera in Pregnancy.*—In a communication to the Paris Academy of Medicine, Queirel,<sup>35</sup> of Marseilles, gave the results in 67 cases of pregnant women attacked by cholera. 39 died and 28 recovered; in 29 the pregnancy was arrested, abortion or premature labor occurring; and of these 29, 9 recovered and 20 died. Then it follows that if the pregnancy is arrested, 66 per cent. perish; but if it continues only 50 per cent.

The death of the fœtus in pregnant women attacked with cholera is not a question of temperature or of hæmorrhagic endometritis, but is to be attributed, as both Queirel and Charpentier hold, chiefly to toxæmia.

*Jaundice in Pregnancy.*—Queirel,<sup>36</sup> of Marseilles, states that there are two forms of jaundice in pregnant women, the one benign, depending upon simple hepatic congestion, and the other malignant, caused by parenchymatous hepatitis. The jaundice observed in the early part of pregnancy is usually of the former character; while occurring in the second half, and especially at its close, the grave form is more frequently found. Queirel has also observed a phenomenon not noted by authors, and that is a jaundice at the beginning of pregnancy, coinciding with the first menstrual suppression; this he attributes to a temporary congestion of the liver consequent upon the absence of the usual flow from the uterus, and, like the benign jaundice referred to, soon disappears. He also establishes the fact by citing cases, that icterus occurring in pregnancy, even when dependent upon an advanced state of alteration the liver, may be cured.

*The Significance of Icterus Gravidarum for Mother and Child.*—Lomer<sup>37</sup> had a pregnant patient affected with icterus who had previously had eight labors, and during two of her pregnancies had renal disease, who was in the eighth month of pregnancy. She was delivered the third day after the appearance of the disease by version and extraction of a weak but living child. The

amniotic liquor was icterode in color, but the child was free from disease, though the mother's skin was deeply discolored. From the observation of this case, and from other cases Leopold has collected, he feels authorized to state that the child in these cases is generally born free from icterus; but that in exceptional cases the biliary pigment can reach the child through the placenta, and the former may be born icteric. Lomer also holds, from examination of the literature of the subject, that icterus in a pregnant woman is a very serious affection, because acute yellow atrophy of the liver may follow.

*Chorea in Pregnancy.*—Prof. Wasseige<sup>38</sup> reports the case of a primigravida who, when in the seventh month and as the consequence of a severe fright, was attacked with chorea. Fowler's solution, chloral, and the potassic bromide having been uselessly given, a camisole was employed with the hope of suppressing the disordered movements. It was impossible for her to eat or sleep, and forced delivery was resorted to. She was put under the influence of chloroform. In this delivery an attempt was made, after partial dilatation of the neck, to perform podalic version. As it failed the forceps was applied, incisions of the neck made, and after great difficulty the child was extracted. Hæmorrhage followed the extraction, and artificial delivery of the placenta was necessary. A convulsive attack occurred in half an hour, lasted some minutes, and then ended in death, with all the signs of general exhaustion and collapse.

*Lithiasis in Pregnancy.*—Among the valuable papers presented to the late International Medical Congress is one with the above title by J. E. Kelly,<sup>39</sup> of New York City. In it the author reviews the characteristics of lithiasis, and their analogous manifestations in pregnancy with the physiological processes occurring in the latter. This is a carefully prepared physiological article; but we do not think all the points of analogy are quite clear, possibly not even correct, *e.g.*, attributing eclampsia and other acute disorders, especially in difficult or tedious labors, to accumulation of the urates and uric acid in the blood and in the tissues generally.

*Salivation of Pregnancy.*—Schramm<sup>40</sup> has reported a case of ptyalism in a pregnant woman successfully treated by the potassic bromide after the failure of various other means. Among these

means was atropia which did some good, but had to be given up because of its toxic effect.

*Surgical Operations in Pregnancy.*—Loviot<sup>41</sup> has reported a case of pregnancy of two or two and a half months in which the woman had the left eye enucleated without gestation being interrupted, and continuing to full period.

*Myotomy in Pregnancy.*—Frommel<sup>42</sup> gives as indications for the removal of fibroids in pregnancy: (1) Subserous tumors capable of enormous growth. (2) The tumor being so situated that the birth of the child through the natural passage is impossible. (3) Softening and sloughing of the tumor. The author operated on a case in which the tumor occupied with a broad base the uterine wall. Convalescence was disturbed by poisoning with iodoform, but pregnancy was not interrupted.

*Ovariectomy in Pregnant Women.*—Several cases of ovariectomy done in pregnant women have been reported by Mundé and others, and in the great majority the pregnancy was undisturbed.

Stratz,<sup>43</sup> from a study of 19 cases of pregnancy complicated by ovarian tumors, in 14 of which ovariectomy was performed, concludes that if this operation is necessary, the prognosis is not rendered unfavorable by the fact of gestation.

#### ABORTION.

Numerous contributions to this subject, both in regard to etiology and treatment, have appeared in medical journals during the past year. Among the most valuable of these papers are the Lumleian Lectures by Dr. Priestley on the Pathology of Intra-Uterine Death. The lecturer endeavors to ascertain the ratio of abortions to pregnancies and to labors; but his statistics add no new light to a problem which must remain, from the nature of things, incapable of absolute answer. For many abortions are concealed, and many others occur with so little disturbance that a woman may abort repeatedly without knowing the fact. Hence it is impossible to compile statistics without greater or less error. According to Dr. Priestley, while in young women the proportion of those who abort is one in three, in old women this relation is directly reversed,—it being about two in three.

In considering the causes of abortion, the first presented are those relating to the father. Dr. Priestley states that “in some



cases conception takes place, but it is vitiated from the beginning by some alteration in the fecundating fluid;" and again, "the male parent may be too young or too old to impart the necessary potency to the spermatic fluid." Such forms of expression are unfortunate, for they seem to indicate that the fecundation is effected by this fluid and not by a single element in it. In reference to this cause of abortion, we think he misquotes Deviliers in the following: "Deviliers points out that the procreating power is essentially distinct from that of development; and hence that a man may possess the power to fertilize, but his whole strength may be expended in this act, and may not extend beyond, so that there is no further development. He further states that the faculty of development is relative. Thus a weak man may impregnate a robust woman, and by so much as she has strength to impart, the vitality of the germ may be carried on entirely under the influence of the woman." What Deviliers did say is this, as any one can ascertain by referring to the fourth volume of the *Nouveau Dictionnaire de Médecine et de Chirurgie Pratiques*, page 206: "It has been thought that a man whose constitution is exhausted by excess, diseases or age, can engender only a product unfit for development. We observe that the power of procreation is completely distinct from that of development, and that the latter is entirely relative. In fact, if a man placed in the conditions we have just indicated fecundates a robust and healthy woman, once the generating influx has been given by the man, the evolution of the product for the future remains almost entirely under the influence of the degree of the vitality of the woman. It is then probable that the influence of the father, as a cause of abortion, is at least very restricted." We think our readers will agree with us in believing that Deviliers has not been correctly quoted by Priestley.

Lead-poisoning on the part of the father as a cause of abortion—a matter to which some French authorities have chiefly drawn attention—is referred to, but only one writer quoted. Syphilis of the father is very fully presented.

Next, maternal causes of abortion are considered under the division of general and specific causes. The former are stated to be "any adverse influences which enfeeble and depress the general health of the individual parents, and so impair the procreative power." The reference to both of the parents in this sentence,

when the maternal causes of abortion are being considered, as well as the somewhat singular use of the term procreation, does not contribute to the clearness and force of the statement.

In presenting "direct and specific causes in the mother," the author at first refers to acute diseases, and states in regard to those attended with pyrexia and increase of temperature, that "the danger to the child in utero bears a strict relation to the height of the temperature and the amount of systemic disturbance." The question as to the injurious influence of a high temperature upon the fœtus is not as simple a one as Priestley has stated; for more recent experiments than those of Runge, to which he refers, have shown that if the increase in temperature be gradual, no such injurious results follow.

The injurious effects of small-pox upon pregnancy are given, and the author states that scarlatina, measles, erysipelas, diphtheria, typhoid fever, and its congeners, come within the same category. Each and all are inimical to pregnancy. Pneumonia is spoken of as one of the non-specific forms of disease attended by fever which always has a special gravity when complicated by pregnancy. As Friedländer has proved, this disease depends upon a micrococcus. It is therefore specific. Pleurisy, it is stated, if severe, may imperil pregnancy in the same way as pneumonia. Nevertheless cases of pregnant women who abort, or die from the former, are very few in comparison with those in which such results follow the latter. In a word, pleurisy is rarely a grave complication of pregnancy.

Death of the fœtus which so soon follows eclampsia of the mother if delivery does not occur promptly, is attributed by the author to the high temperature resulting from the disease, or want of proper aeration of the blood, or its vitiation by uræmic poison. The first is doubtful, and the other two the more probable causes. Phthisis, in which there is an admitted fertility among women which is almost abnormal, gives a tendency to abortion and premature labor, although not very striking, yet greater than among healthy women. The topic of syphilis of the mother as a cause of abortion is presented, and the following is the summing up of his views upon it. "Thus it has been proved (1) that if a woman has syphilis before conception, she is much more predisposed to abortion than a woman taking the disease after conception; (2)

if conception and syphilis commence together, abortion or premature labor with a dead child is the rule, but treatment is more potent in preventing them; (3) syphilis acquired after the mid-period of pregnancy has less influence upon the child, and it may escape altogether."

Reflex causes are next considered. The author states that it has been said cutting a wisdom tooth or toothache has caused abortion; and he mentions that he has known extraction of a tooth to have this effect. But such cases are utterly exceptional, and hardly deserve notice save as medical curiosities. A surgical operation in pregnancy is, according to Priestley, especially liable to cause interruption of pregnancy if the wound goes wrong, and there is constitutional irritative fever. Gastric, vesical, rectal, and ovarian irritation are mentioned as sometimes causing abortion.

The influence of mental emotion is presented, and it is stated that there is reason to believe that a sudden mental shock may at once kill the embryo, or child, even if it be retained for some time afterwards. It is also asserted that the fear of miscarriage has produced it.

The causes of intra-uterine death next considered are faulty conditions of the foetal envelopes and foetal appendages. Under this head diseases of the decidua are first presented. There may be imperfect or excessive development of the decidua, or there may be extravasations of blood between the reflex decidua and the chorion, resulting in that condition known as apoplexy of the ovum. Three forms of decidual endometritis are described, viz., chronic diffuse, polypoid, and catarrhal. Diseases of the chorion come next. The author very fully presents the so-called cystic degeneration of the chorial villi, and seems to accept the teaching of Virchow as to the true nature of the affection being myxomatous. In regard to the question as to whether the death of the foetus preceded, or followed the change in the chorion, he adopts the latter view. He also accepts Virchow's teaching as to the chorionic disease being caused by a diseased condition of the decidua which, becoming inflamed and thickened before impregnation, is incapable of receiving and supporting the villi of the chorion which try to take root in it.

Morbid changes in the amnion are discussed briefly. The author seems to doubt whether inflammation of this membrane

occurs, and he states in regard to the cause of hydramnios: "The impression derived from a careful study of all the circumstances is that hydramnios is not a product of inflammation of the amnion, as some have supposed, but that it arises from constitutional conditions affecting the mother, sometimes from local causes."

The following diseases of the placenta are presented in order: Apoplexy, inflammation, phthisis, fatty degeneration, and fibrous myxoma, and syphilis. Under the head of treatment the author states that while syphilis is the most prominent condition predisposing to abortion, anaemia stands next. The proper therapeutics of each of these conditions is obvious. He suggests as probable that some of the forms of degeneration found in the foetal membranes and placenta are due to defects in the constitution of the blood in one or both parents. Whether the fault lies with the male or female parent may not be easily determined. If there is obvious anaemia or deterioration of health in one or other, it may be enough to place the one apparently deranged under treatment. But this indication not being forthcoming, it will be desirable to put both parents on iron, combined, perhaps, with quinine, arsenic, or other tonic remedies, as may seem suitable in each particular case." This doubtless is all very wise and proper; but to give a man iron, etc., because his wife miscarries, and he may be a little anaemic or otherwise below par, reads as if the treatment would commend itself especially to those savage races whose unalterable custom requires paternal lying-in.

In commenting upon the administration of potassic chlorate to prevent abortion, first advised by Sir J. Y. Simpson, on the ground that the salt yielded oxygen in the blood, an hypothesis that is utterly untenable, Priestley suggests that it promotes alkalinity of the blood, and thus prevents the formation of coagula and fibrinous deposits in the placenta. Possibly, but some readers would like to have it unequivocally proved, ten or fifteen grains of this medicine given three times a day does uniformly prevent abortion.

*The Influence of Saturnism of Paternal Origin upon the Product of Conception.*—This is the title of a paper by Dr. R. Lefour. The subject of lead poisoning of the mother in its influence upon pregnancy was the subject of special study by Constantin Paul, who in 1860 published an important memoir upon it in the *Archives Générales de Médecine*. The following statistics

presented by Paul show how frequently the pregnancy is arrested: (1) When women are suffering with lead poisoning at the time of being pregnant. Four women thus affected gave fifteen pregnancies, and the terminations were as follow:—

|                                   |    |
|-----------------------------------|----|
| Abortions, . . . . .              | 10 |
| Premature labors, . . . . .       | 2  |
| Still-born child, . . . . .       | 1  |
| Child dead in 24 hours, . . . . . | 1  |
| Child survived, . . . . .         | 1  |

(2) The second class includes women who had favorable pregnancies before exposure to lead poisoning. There were five of these, and prior to the poisoning, they gave nine favorable pregnancies, terminating as follow:—

|  |    |
|--|----|
| Abortions from 2 to 6 months, . . . . .              | 26 |
| Premature labor, . . . . .                           | 1  |
| Still-born children, . . . . .                       | 2  |
| Children dead within the first year, . . . . .       | 4  |
| Child dead in the second year, . . . . .             | 1  |
| Child living, not 3 years old, . . . . .             | 1  |
| Child living beyond 3 years, but delicate, . . . . . | 1  |

Lefour adds to Paul's statistics of women completely free from lead poisoning, but who became pregnant by husbands who were lead workers, and the general result was that of 120 pregnancies, 63 ended by abortion, 4 by premature labor, 4 with still-born children; in 36 children born alive, death occurred in a short time, and only 13 children survived. Lefour then gives Rennert's statistics, *Arch. f. Gynäkol.*, 1881. He had previously referred to a Paris thesis, by Roque, in 1873. These several papers by Paul, Roque, Rennert, and Lefour<sup>44</sup> constitute the chief literature of the subject. It is somewhat remarkable that Priestley, in referring to this topic in his Lumleian lectures, does not mention the researches of Roque, or of Rennert, though he does those of Paul. Lefour holds that the injurious effect of lead poisoning, whether of maternal or paternal origin, either affects the fœtus or its appendages. Rennert has shown the frequency of macrocephalia, and Roque has insisted upon the common occurrence of idiocy, epilepsy, and imbecility in the offspring of workers in lead.

*Removal of a Uterine Polypus, followed by Abortion.*—Dr. W. H. Lancaster,<sup>45</sup> of Coleman, Texas, reports the case of a woman, 29 years of age, married 5 years without having borne a child, to whom he was called, and finding a cervical polypus

removed it with forceps on the 13th of September. On the 18th he dilated the cervical canal, searching for another polypus which he thought might be present, but failed to find any. On the 19th of November the woman miscarried, the fœtus being three or three and a half months. The time intervening between the operations, that is the removal of the polypus and the dilatation, and the miscarriage, was too great for the latter to be considered by sensible persons, lay or professional, the consequence of the former. Yet the doctor was threatened with suit for malpractice!

*Syphilis in its Influence upon Pregnancy.*—The following are the results given by Hiridoyen<sup>46</sup> from observations in the Bordeaux Maternity Hospital: (1) The proportion of syphilitic women in the hospital is about 5 per cent.; (2) that five-sixths of the infected women are unmarried; (3) that syphilis modifies the course of pregnancy most frequently by causing premature labor; (4) that the period of infection has a marked influence in the production of the accidents; (5) that out of eight women, syphilitic since one or two years, two gave birth to living but delicate children; (6) that out of twelve women who became infected during the first four months of pregnancy, all gave birth to still-born children; (7) that infection between the fourth and sixth month is also very fatal to the children, seeing that at least one-half succumb; (8) that syphilis contracted during the last three months of pregnancy caused a mortality of four out of seven; (9) out of thirty-three pregnancies in syphilitic women, eight resulted in the birth of living children, three-quarters of the pregnancies in the hospital terminating by the death of the fœtus; (10) that syphilis may exceptionally give rise to complications during or after labor; (11) finally, that to be effective, anti-syphilitic treatment should be begun at the very beginning of pregnancy, and continued during its entire course.

*Abortion following the use of Potassic Permanganate.*—Dr. S. B. Sperry,<sup>47</sup> of Delafield, reports a case of abortion following the administration of potassic permanganate, and states that this is not the first instance of this result following the use of the drug. A similar case is reported subsequently by Dr. J. J. Mann.<sup>48</sup>

*Presentation other than of the Head a Cause of Abortion in the Fourth or Fifth Month.*—Dr. Judson Bradley<sup>49</sup> suggested that some cases of abortion in the fourth or fifth month of pregnancy

arise from a rupture of the ovum at its lower part by spontaneous movements of the fœtal members, a foot for example. In plain words, the fœtus kicks a hole in its enclosing sac.

*Treatment of Abortion.*—While most authorities still hold that if possible an abortion should be prevented, some advocate the rule that in case of a diseased ovum this is not desirable; and therefore in such cases, rest, opium, and other means so generally employed to arrest uterine activity are not indicated, but the woman should be up as usual. Although this rule was maintained by Schroeder, and is now advocated by Veit and others, it ought not to be received absolutely. As a practical matter it is claimed that such a pregnancy will be inevitably interrupted; and it is in vain to put the evil day off by requiring the patient to remain in bed while hæmorrhage continues; and we vainly, too, give opium to stop uterine contractions. But the ovum, composed of deciduous membranes, of chorion, amnion, and the contents of the sac, may be diseased in one or more of its constituents, and the pathological condition may or may not terminate the pregnancy. For example, the writer has had under his care a multigravida who was attacked with hæmorrhage two months after pregnancy began. Similar occurrence of hæmorrhage took place at frequent intervals during the following five months, and the quantity of blood lost frequently four or five times greater than that at a normal menstrual period. This woman kept her bed most of the time for five months, using hot water vaginal injections when hæmorrhage occurred, and opium suppositories as uterine contractions required. The pregnancy was thus continued until seven months, when the tendency of the uterus to empty itself could no longer be resisted, and she gave birth to a child which continued to live. An examination of the external surface of the membranes showed great thickening of the decidua, and numerous flat patches of old hæmorrhagic effusions. Of course if prophylactic means had not been used, and if this patient had been permitted to be up and attending to her household duties, the womb would have expelled its contents much sooner; but there would have been no gain to her in that, and her child of course would have perished. Hence the practice advised of letting the pregnancy end as soon as possible, in case the ovum is diseased, cannot be accepted in all cases. There is, therefore, a prophylactic treatment of abortion, and this will now be considered.

*Assafetida in the Treatment of Habitual Abortion.*—Negri<sup>50</sup> was successful in a patient who had several abortions, and who had no symptoms of syphilis, by giving eighteen grains of assafetida several times daily for a long time, in continuing the pregnancies to the normal time.

*Iodide of Potassium.*—Upon the hypothesis that habitual abortion is almost exclusively caused by syphilitic and inflammatory diseases of the maternal genital apparatus and ovum, the prolonged and systematic administration of this drug to pregnant women disposed to habitual abortion is advised in the *Vratch*.

*Viburnum Prunifolium.*—In a translation from *La Rivista Internazionale*,<sup>51</sup> the following is found: "In 1866, Ferris, an English physician, recalled attention to an ancient popular remedy, viburnum prunifolium, which he recommended in the highest terms for the prevention of abortion and premature delivery. Subsequently, Wilson, of Liverpool, employed this remedy with success. Recently, Lwow, of Kazan, has tried it in fifteen cases. Not one of the fifteen aborted." The translator adds that he has tried the remedy without any favorable influence whatever in two cases.

It is hardly necessary to state that the "English physician" was an American physician, that his name was Phares, and not Ferris, and that he lived in Mississippi. The antiquity of the remedy is not very clear, for it was first known as a popular remedy among the slaves of the South.

Viburnum is recommended by Dr. C. Beville,<sup>52</sup> the remedy having proved successful in some cases in his hands in preventing abortion.

*Tincture of Iron and the Potassic Chlorate.*—Strother reports a case in which habitual abortion was prevented by administering these remedies in combination. He believed that in this patient the abortions were caused by fatty degeneration of the placenta, and that these remedies prevented it.

*Incomplete Abortion.*—Differences of opinion and of practice still exist as to the treatment of incomplete abortion. Some insist upon immediate and active interference, while others, diligently using antiseptics, wait until nature completes her work, or until positive indications for intervention are presented. Budin, for example, in a lecture published in the *Progrès Médical*, of which a very good translation appears in the *North Carolina Medical Journal*, March, 1887, says: "Contrary to the opinion established



by certain authors, the retention of the adnexa of the fœtus is only rarely the origin of complications, if recourse be had to antiseptics. On the other hand, of the different methods of intervention which have been counselled and put in practice, some are insufficient, others dangerous. Hence we never deem it necessary to interfere when, the fœtus having been expelled, the placenta remains in the uterine cavity. One may content himself with the observance of cleanliness and the use of antiseptic vaginal injections two or three times a day, and the secundines will be expelled spontaneously. Of course this expectation ceases if hæmorrhage or an offensive discharge occurs, and immediate active treatment is indicated.

On the other hand, Dührssen<sup>53</sup> believes in active interference at once. He uses the curette after an abortion of the first two months in order to remove the still attached decidua vera. In the third month, remove the embryo and its membranes, and curette the decidua vera. One argument for his active treatment is that most of the women being poor, their time is saved, so that they can be back at their work sooner, and not have to wait the spontaneous expulsion of any membranes.

Auvard,<sup>54</sup> referring to the treatment of abortion, says: "It is bad in some cases to wait, equally bad in others to intervene. It is necessary to be eclectic, and the course to be pursued may be thus formulated:—

"(a) When after the expulsion of the embryo or fœtus the appendages are retained in the uterine cavity, no accident occurring, the expectant method is the better: expectation with rigid antiseptic precautions. (b) Should accidents occur—hæmorrhage or septicæmia—the treatment of each is different. Hæmorrhage is met by hot water injections, and, if necessary, by the tampon. If the genital flow becomes fœtid, or before this fœtidity, as a preventive measure, make frequent vaginal injections of antiseptic solution,—injection for example of the liquor of Van Swieten, either pure or half the strength, every two hours. If vaginal injections do not answer, use injections into the uterus. Finally, if these also fail, the fœtid odor persisting, and especially if there be an elevation of temperature, employ the curette."

Bataud<sup>55</sup> states that if at the end of twenty-four hours the placenta is not expelled, place the patient in the obstetrical position,

introduce a speculum, and project upon the cervix by means of an irrigator a douche of hot water. Almost always under the influence of this stream of hot water the uterus contracts, and expels the placenta a short time after the patient has been replaced in her ordinary position in bed.

Chéron<sup>56</sup> highly commends intra-uterine galvanization, the negative pole being passed into the womb, and the positive placed upon the hypogastrium. The strength of the current is 15 to 20 milliampères.

Lycett<sup>57</sup> says: "I have found instruments of the greatest service in the management of some cases of abortion, without which I could not, in many instances, have possibly succeeded." He seems entirely to reject the expectant treatment.

*Écouvillonnage* of the uterus is the treatment of abortion with which the name of Doléris<sup>58</sup> is especially identified. The *écouvillon*, introduced by him into practice at least as early as 1883, is an instrument similar to that used for cleaning the inside of bottles, or of lamp chimneys. It is dipped in an antiseptic mixture, then introduced into the uterus, and the uterine wall thoroughly brushed, we might almost say swept and scrubbed, so that all fragments of the decidua are effectively removed.

#### REFERENCES.

1. London Lancet. 2. London Lancet. 3. Kansas City Med. Record. 4. Med. News. 5. Ther. Gaz. 6. N. Y. Med. Jour. 7. Med. and Surg. Rep. 8. Archiv f. Gynékol. 9. Pacific Record. 10. Centralb. f. Gynékol. 11. St. Louis Weekly Med. Rev. 12. Archiv f. Gynékol. 13. Trans. Am. Gynecol. Soc., vol. xi. 14. Allg. Wien. Med. Zeit. 15. Boston Med. and Surg. Jour. 16. London Lancet. 17. Southern Practitioner. 18. Deut. Med. Woch. 19. Peoria Med. Monthly. 20. Jour. Med. and Dosimet Therap. 21. An. de Gynécol. 22. Med. and Surg. Reporter. 23. l'Union Méd. du Canada. 24. Boston Med. and Surg. Jour. 25. South. Cal. Pract. 26. Bul. de Thérap. 27. Brit. Med. Jour. 28. An. de Gynécol. 29. Deut. Med. Zeit. 30. France Méd. 31. Med. News. 32. Canadian Pract. 33. Lyon Méd. 34. Brit. Med. Jour. 35. Gaz. hebdom. des Sc. Méd. de Bordeaux. 36. Jour. de Méd. et de Chirurgie. 37. Deut. Med. Zeit. 38. Acad. Roy. de Méd. de Belg. 39. Jour. Am. Med. Assoc. 40. Memorabil. 41. An. de Gynécol. 42. Münch. Med. Woch. 43. Zeit. f. Geb. u. Gynék. 44. Gaz. hebdom. de Sc. Méd. de Bord. 45. Daniels' Texas Med. Jour. 46. London Med. Rec. 47. Therap. Gaz. 48. Therap. Gaz. 49. Detroit Lancet. 50. Sperimentale. 51. Am. Practitioner. 52. Therap. Gaz. 53. Arch. f. Gynék. 54. Gaz. Hebdom. 55. Gaz. de Gynécol. 56. Rev. Med. Chir. de Mal. de Femmes. 57. Birmingham Med. Rev. 58. Nouv. Arch. Obst. et de Gynécol.

[Undated references apply to journals published in 1887, and original articles can be found by consulting the indexes of the respective publications.]

## OBSTETRICS.

By WILLIAM L. RICHARDSON, M.D.,

BOSTON.

---

### ANTISEPTICS IN MIDWIFERY.

SINCE the appearance of Koch's work on bacteria, obstetricians all over the world have been endeavoring to find out how best to banish puerperal septicaemia from the lying-in chamber and maternity hospitals. No one who has carefully investigated the subject denies that it can be banished, if the proper prophylactic measures are taken. Its occurrence signifies a defect somewhere in the method adopted, and, as C. Vinay<sup>1</sup> states, in closing a most admirable paper on the subject, the obstetrician should be held responsible for any variation, great or slight, from a normal convalescence, provided of course that such variation is due to septic infection. Practical obstetricians in Europe and this country are diligently trying to solve the problem, for all agree that it can be solved. Meanwhile an immense saving of life has been accomplished, and the medical journals of the past year are filled with the most gratifying results already attained. The death-rate of the maternity hospitals has fallen to varying fractions of one per cent., and the results reported from private practice are equally gratifying. So marked has been the improvement in this respect that Dr. Litthauer<sup>2</sup> urges that the use of antiseptics should be required by law, the expense attending their use in dispensary practice being paid by the local authorities. In private practice it is not easy to always carry out so complete a prophylactic method as is possible in the wards of a hospital. Until very recently lying-in hospitals were regarded with disfavor, and the advisability of closing them by legislative interference has again and again been seriously discussed. All this is now changed, and an examination of the returns of the various maternities in Europe and America, which have been published during the past year, show conclusively, as Secheyron<sup>3</sup> has stated, that, so far as the advantages to be derived

from prophylactic measures are concerned, women are safer within than outside the walls of a lying-in hospital.

During the year various modifications in the methods adopted have been reported. Antisepsis and asepsis are the two methods now recognized as affording prophylaxis against septicæmia. By the former, germs lodged on a wounded surface are destroyed and any septic products are rendered harmless; by the latter these germs are prevented from coming in contact with a wounded surface. The former method is therefore curative, while the latter is prophylactic; and, if the latter could be carried out perfectly, the former would be unnecessary. Most admirable papers on these two methods of treatment have been contributed during the past year by Secheyron<sup>3</sup> and Vinay.<sup>1</sup> The former insists on the necessity of keeping the patient scrupulously clean during a confinement and every thing aseptic which comes in contact with her. For the attendant's use as an antiseptic he recommends a 5 per cent. solution of carbolic acid. Vaginal douches should be used at the beginning of labor and repeated every two hours during its progress. After the birth of the child, and also when the placenta has come away, a douche of corrosive sublimate (1-1000) should be given, and a pad applied to the vulva. During the convalescence, vaginal douches should be given twice daily, if the lochia become offensive; otherwise they should not be used. Vinay, on the other hand, believes that more can be gained if greater attention were paid to asepsis and less reliance placed upon antisepsis. While insisting on the necessity of absolute cleanliness on the part of the physician, the patient and every thing which comes in contact with her, he does not believe in the frequent use of the douche, as advised by Secheyron. In this particular Bokelmann<sup>4</sup> agrees with Vinay. Dr. Lomer,<sup>5</sup> of Hamburg, and Dr. Vulliet,<sup>6</sup> of Geneva, insist upon the necessity of more attention being paid to asepsis,—the use of antiseptics being a matter of secondary importance.

That antiseptic douching has been too freely practiced there can be no question, nor can it be doubted that corrosive sublimate is a most dangerous weapon, if carelessly used. The charge upon the microbe has really been too aggressive. It has been transferred to the patients, many of whom have paid dearly for its use. Before labor, when there are no erosions, and when the absorbing

surface is confined to the orifice of certain glands, corrosive sublimate can be used with comparative safety for the purpose of cleansing the vagina. Fleischman,<sup>7</sup> however, reports a case of a primipara who at the beginning of labor received two vaginal douches of corrosive sublimate (1-2000) and died on the eighth day with all the symptoms of mercurial poisoning, the diagnosis being confirmed at the autopsy. Stadtfeld, Lomer, Voeltz, Winter, Gruwe, Thorn, Schawrz, Braun and Butte have also reported eight fatal cases following the use of corrosive sublimate, and accidents not resulting fatally have been reported by Bokelmann, Mäuer, Elsässer, Stenger, Taenzer, Winter, Richardson, Mijulieff and Clarke. Dr. L. Doléris<sup>9</sup> reports fatal cases as occurring in the practice of Hofmcier, Veit, Partridge, Fränkel, Tarnier, and Doléris. Virchow<sup>10</sup> also reports two fatal cases. It is not uncommon to have salivation, ulcerations, etc., in cases which recover. These symptoms may be accompanied by high temperature, extreme debility, a profuse, fœtid, thin and oftentimes bloody diarrhœa with tenesmus. The colon is congested; the rectum is the seat of deep, well-defined ulcerations. The urine is scanty and albuminous. Erythematous patches of varying shapes appear on different parts of the body. In these cases where salivation has gone on for some time Dahl, Laikarsky and Prévost have found characteristic lesions of the kidneys similar to those found in animals experimentally poisoned by mercury. Letulle<sup>11</sup> describes, as one of the indirect effects of mercurial poisoning, lesions of the peripheral nerves.

As regards the use of intra-uterine injections of corrosive sublimate Dr. J. H. Croom,<sup>12</sup> of Edinburgh, advises their use whenever there is an offensive uterine discharge accompanied by symptoms of septicæmia; after the birth of a putrid child; in those cases where there is an acute uterine flexion, causing a retention of decomposing lochia, and also whenever it has been found necessary to introduce the hand within the uterine cavity. The temperature of the injection should be 115° F. so as to favor contraction of the uterus and the strength of the solution should be 1-4000. He agrees with Dr. Bokelmann that such an injection might do harm if the case was complicated by perimetritic or parametric inflammation. On the other hand, Dr. Berry Hart does not think that parametritis in any way contra-indicates their use.

Dr. Otto v. Herff,<sup>13</sup> of Darmstadt, believes that the danger from uterine absorption is very slight, inasmuch as the contractions of the uterus tend to force out the solution. He thinks that absorption readily takes place along the vaginal tract. Dr. Gustav Braun, of Vienna, agrees with him in these views. Prof. Simpson<sup>14</sup> advises the following up an intra-uterine mercurial injection with one of carbolic acid. Vinay and G. Braun<sup>15</sup> use an injection of sterilized or boiled water after using the corrosive sublimate.

There can be no question that mercurial injections, whether vaginal or intra-uterine, should be sparingly used, if used at all, in patients with disease of the kidneys, or in cases of open wounds or eroded surfaces. The danger of their use in such cases has been emphasized by Doléris, Corresponding Editor of the *ANNUAL*, Davis,<sup>16</sup> L. Butte,<sup>17</sup> and others. It is certain, according to Doléris, that grave results have followed the use of solutions as weak as 1 to 5000. Dr. Szabo,<sup>18</sup> of Buda-Pesth, believes that their use is also contra-indicated in anæmic or phthisical women. Recognizing the danger which may follow the use of corrosive sublimate, Drs. Fancourt Barnes, Corresponding Editor of the *ANNUAL*, Fleischmann, and others favor the substitution of carbolic acid, which is equally effective as an antiseptic. Dr. Mangiagalli<sup>19</sup> advises the use of the biniodide of mercury instead of corrosive sublimate. The advantage claimed for it is that it is less poisonous and is not a local irritant, while it is equally efficacious as an antiseptic. It is very slightly soluble in water, and must therefore be used in solution with the iodide of potash, in the proportion of 1.2 of potash to 1 of mercury. The strength of the solution required as an antiseptic, is only .25 per cent.

Dr. Bokelmann<sup>20</sup> reports that corrosive sublimate injections are now used in Berlin of the strength of 1-5000, and that no cases of poisoning have occurred. Dr. A. N. Solovioff,<sup>21</sup> of Moscow, also considers that a solution of that strength is sufficient for prophylactic purposes. He recommends that after a vaginal douche care should be taken to expel the fluid from the vagina by backward pressure on the perineum. Dr. Bokelmann calls attention to the fact that offensive lochia may have its origin in the vagina from the presence of placental tufts or pieces of membrane. If, however, a vaginal antiseptic injection does not correct the odor, it is fair to presume that the decomposition is going on within the uterine

cavity. Dr. L. Roulin<sup>22</sup> reports five cases of serious disturbances following the use of intra-uterine injections. The symptoms were chill, vomiting, and abdominal pain. The cases terminated favorably, and Dr. Roulin questions whether they were not occasioned by the introduction of the intra-uterine tube, thus resembling the symptoms sometimes observed in the passage of the catheter.

Many writers have favored the use of powdered iodoform on lacerations of the perineum and vagina, and the introduction of suppositories containing iodoform within the uterine cavity. It does not yet seem settled what value iodoform possesses as a germicide. Drs. Heyn and Roving<sup>23</sup> believe that it not only is not an antiseptic, but that it may itself contain poisonous germs. De Ruyter,<sup>24</sup> on the other hand, asserts that the exudation of wounds decomposes iodoform, thus rendering it antiseptic. Whether iodoform be a germicide or not, unquestionably good results follow its use as recommended in obstetric practice.

A review of the numerous articles which have been written during the past year on the use of antiseptics in obstetric practice, and an examination of the cases and results reported, can only serve to enhance their value. The dangers which are known to follow their use have brought about certain modifications in the method of using them, and such modifications are reducing these dangers to a minimum.

Absolute cleanliness, so far as the patient and her surroundings are concerned, is recognized as the first step toward prophylaxis. The free use of antiseptics, soap and water by the physician and nurse are of equal importance. The necessity of limiting the number of vaginal examinations and of appreciating the value of external examinations for the diagnosis, not only of the presentation but also the position are being recognized.

In this connection mention should be made of the valuable paper by Dr. Rivière,<sup>25</sup> in which he calls attention to the fact that it is often easy to detect the shoulder through the abdominal wall. It will be found that the shoulder always occupies the same side of the pelvis as the occiput. When the head is engaged the forehead is easily made out, and, if the forehead is to the right, the shoulder is to the left in left positions, and, if the forehead is to the left, the shoulder is to the right in right positions. In

anterior positions the shoulder is at the median line, and forms a marked protuberance, but not very low down; while in posterior positions it is nearly three inches away from the median line, and forms only a slight elevation and lower down.

Credé,<sup>26</sup> in his report of the results obtained in Leipsic, dwells especially on the danger of too frequent vaginal examinations. Too much importance has been attached to the frequent use of antiseptic vaginal injections during the progress of a case of labor, and it is now recognized that repeated vaginal douches are not only superfluous, but dangerous, as Dr. Szabó,<sup>27</sup> of Buda-Pesth, has shown. An injection at the beginning of labor seems to be generally admitted to be all that is required, unless it has been found necessary to introduce the hand or instruments within the vagina, in which case the injection should be repeated at the close of the third stage of labor. Intra-uterine injections are called for only after the birth of a decomposed fœtus or the introduction of the hand within the uterine cavity. The method of disinfecting the lying-in room by the use of the vapor of corrosive sublimate, as suggested by König, has been shown by experiments conducted by Kreibohm<sup>28</sup> at Göttingen and Heræus at Berlin to be valueless. More attention is being paid to the condition of the perineum and vaginal tract, and Prof. Kufferath,<sup>29</sup> of Brussels, agrees with Dr. Ernest Thone,<sup>30</sup> who contributes a valuable monograph upon the importance of having all such lacerations at once brought together by sutures. The use of oil or vaseline is contra-indicated, inasmuch as it at once destroys the thoroughness of any prophylactic method. Vinay recommends that either carbolized oil (1-5) or corrosive vaseline (1-200) be used, and Richardson<sup>31</sup> favors an ointment made of the oil of eucalyptus and vaseline (5j-3j), as used in the Boston Lying-in Hospital.

#### ANÆSTHETICS IN LABOR.

Dr. Fordyce Barker<sup>32</sup> believes that chloroform is the best and safest anæsthetic for obstetrical cases. In labor complicated with renal disease it is free from the danger which attends the use of ether. While unquestionably it often prolongs labor, it yet preserves the nerve force and vital powers. In the great majority of cases, however, its use accelerates the progress of the labor. It is well known that patients with cardiac disease are



especially liable to post-partum hæmorrhage. Dr. Barker disagrees with the prevalent opinion that chloroform is especially dangerous to such patients, and cites, as proof of his statement, his experience with several patients whose labor, though complicated with heart disease, terminated favorably,—the result unquestionably being due to the judicious use of chloroform. The great advantage derived from its use was the preservation of the nerve force and vital power, thus preventing uterine exhaustion, which is the chief cause of post-partum hæmorrhage.

Dr. Kreutzmann,<sup>33</sup> of San Francisco, recommends the use of a mixture of chloroform, ether and oxygen. The preparation used consists of three parts of chloroform and one part of ether and alcohol in equal amounts. This mixture is administered by means of an inhaler, through which passes oxygen instead of air. The oxygen can easily be carried in a balloon. The great advantage claimed for this form of anæsthetic is that a slight degree of anæsthesia can be rapidly obtained without any preliminary stage of excitement, and with an almost immediate return to complete consciousness on withdrawing the inhaler. Deep narcosis can also be readily obtained, from which also the patient soon awakens and without any after-effects. Its action greatly resembles that of nitrous oxide and oxygen, but it is cheaper, easier to carry, and can be used to produce relaxation (eclampsia, version, etc.) where nitrous oxide is directly contra-indicated.

Soon after the announcement of the anæsthetic properties of cocaine by Koller, in 1884, various attempts were made to test its value in obstetric practice, but as yet no great benefit has been obtained by its use. In the Boston Lying-in Hospital it was tried, but unsuccessfully. Dr. A. M. Harnak,<sup>34</sup> of Moscow, reports a complete failure to obtain any relief from its use. He applied a 10 per cent. solution to the os uteri and vagina. In Boston a 12 per cent. solution has been used with similar results. On the other hand, Dr. W. A. Briggs,<sup>35</sup> has seen great relief, in cases of severe "nagging" pains accompanying cervical dilatation, follow the local use of cocaine, but given in combination with morphia. His formula was  $\mathcal{R}$  cocainæ mur., gr. xv; morphiæ sulphat., gr. j. M. et div. in suppos. iii. The suppositories are made with gelatine, and, after softening in warm water, one is introduced within the cervix uteri. It may be repeated in three hours if

necessary. Dr. G. H. Moore<sup>36</sup> recommends in cases of rigid os uteri, or even for the relief of the pains of the first stage, the use of hollow cases of theobroma, so shaped as to receive the tip of the forefinger of the examining hand, and containing three grains each of cocaine and boric acid.

As a local anæsthetic cocaine has proved of great advantage in relieving the pain which often accompanies the introduction of the catheter after difficult or protracted labors. Dr. G. H. Kemp has found that the application of a small compress, saturated with a 4 per cent. solution of cocaine, to the neighborhood of the meatus renders catheterism an easy and painless operation. The writer has also seen great benefit follow the slow introduction within the urethra of a small bougie, smeared with vaseline and cocaine (5 per cent.), before an attempt is made to pass the catheter.

Dr. S. C. Busey<sup>37</sup> reports a case in which the pains were frequent, short and ineffective. At the moment of greatest intensity violent retching and vomiting would occur and the pains would instantly cease. No progress was made until ether was administered. The vomiting was at once arrested and the labor progressed favorably.

Whether hypnotism is to be counted among the obstetrical anæsthetics of the future must be still a question *sub judice*. Drs. Auvard and Varnier<sup>38</sup> report a case in which the labor began April 17 at 9.30 P.M. and progressed fairly until 12.15 the next morning, the patient being in a hypnotic sleep practically all the time. The pains then ceased for four days, when the labor began and was rapidly completed. The woman was awakened often by the pains, but would drop off to sleep again. She had repeatedly to be put under the hypnotic influence, but while under it she suffered no pain.

Dr. Dumontpallier<sup>39</sup> reports a case of labor in a woman who was hypnotized by pressure on the head. While in the hypnotic state she retained her consciousness, talked with persons around her, and seemed to have a correct appreciation of the duration and force of the uterine contractions. She felt no pain, however, although toward the close of the labor it was impossible to induce hypnotism.

Dr. Carl Braun<sup>40</sup> has had a similar experience, although in

his case the hypnotic condition remained through the whole of the confinement. Dr. Mesnet's<sup>41</sup> case is still more striking. Soon after the beginning of labor the patient was placed in a hypnotic state. The labor was of several hours' duration. After the birth of the child the woman was awakened, and declared that she had not only felt no pain, but had been unconscious of all that had taken place. Several hours later she was again placed in a hypnotic condition, and at once related in detail all the circumstances accompanying the confinement.

## OBSTETRIC NOMENCLATURE.

The Ninth International Medical Congress stamped with its approval an obstetric nomenclature for which the profession is mainly indebted to Prof. Alexander R. Simpson, of Edinburgh. The end to be attained was a uniformity of expression in regard to the pelvic diameters; the diameters of the fœtal head; the presentations and positions of the fœtus; the stages and the factors of labor.

The diameters of the pelvis are:—

1. Antero-posterior: First, between the middle of the sacral promontory and the point in the upper border of the symphysis pubis crossed by the *linea terminalis*=*Diameter Conjugata vera*, Cv.; Second, between the middle of the promontory of the sacrum and the lower border of the symphysis pubis=*Diameter Conjugata diagonalis*, Cd. 2. Transverse: Between the most distant points in the right and left ilio-pectineal lines=*Diameter Transversa*, T. 3. First oblique: Between right sacro-iliac synchondrosis and left pectineal eminence=*Diameter Diagonalis Dextra*, D. D. 4. Second oblique: Between left sacro-iliac synchondrosis and right pectineal eminence=*Diameter Diagonalis Lava*, D. L.

The diameters of the fœtal head are:—

1. From the tip of the occipital bone to the lower margin of the chin=*Diameter Occipito-Mentalis*, O. M. 2. From the occipital protuberance to the root of the nose=*Diameter Occipito Frontalis*, O. F. 3. From the point of union of the neck and occiput to the centre of the anterior fontanelle=*Diameter Sub-Occipito Bregmatica*, S. O. B. 4. Between the two parietal protuberances=*Diameter Bi-Parietalis*, Bi-P. 5. Between the two lower extremities of the coronal suture=*Diameter Bi-Temporalis*, Bi-T.

*Presentations of the Fœtus.*—The *Presenting Part* is the part which is touched by the finger through the vaginal canal, or which, during labor is bounded by the girdle of resistance. The *Occiput* is the portion of the head lying behind the posterior fontanelle. The *Sinciput* is the portion of the head lying in front of the *bregma* (or anterior fontanelle). The *Vertex* is the portion of the head lying between the fontanelles and extending laterally to the parietal protuberances. Three groups of Presentations are to be recognized, two of which have the long axis of the fœtus in correspondence with the long axis of the uterus, whilst in the third the long axis of the fœtus is more oblique or transverse to the uterine axis. *a.* Longitudinal; (a) Cephalic, including Vertex and its modifications; Face and its modifications. (b) Pelvic, including Breech; Feet. (*b*) Transverse or trunk, including shoulder or arm, and other rarer presentations.

*Positions of the Fœtus.*—The positions of the fœtus are best named topographically, according as the denominator looks,—first, to the left or the right side, and secondly, anteriorly or posteriorly. When initial letters are employed, it is desirable to use the initials of the Latin words. In the case of Vertex positions we have: Left Occipito-Anterior=*Occipito-Læva-Anterior*, O. L. A.; Left Occipito-Posterior=*Occipito-Læva-Posterior*, O. L. P.; Right Occipito-Posterior=*Occipito-Dextra-Posterior*, O. D. P.; Right Occipito-Anterior=*Occipito-Dextra-Anterior*, O. D. A. The Face positions are: Right Mento-Posterior=*Mento-Dextra-Posterior*, M. D. P.; Right Mento-Anterior=*Mento-Dextra-Anterior*, M. D. A.; Left Mento-Anterior=*Mento-Læva-Anterior*, M. L. A.; Left Mento-Posterior=*Mento-Læva-Posterior*, M. L. P. The Pelvic positions are: Left Sacro-Anterior=*Sacro-Læva-Anterior*, S. L. A.; Left Sacro-Posterior=*Sacro-Læva-Posterior*, S. L. P.; Right Sacro-Posterior=*Sacro-Dextra-Posterior*, S. D. P.; Right Sacro-Anterior=*Sacro-Dextra-Anterior*, S. D. A. The Shoulder Presentations are: Left Scapula-Anterior=*Scapula-Læva-Anterior*, Sc. L. A.; Left Scapula-Posterior=*Scapula-Læva-Posterior*, Sc. L. P.; Right Scapula-Posterior=*Scapula-Dextra-Posterior*, Sc. D. P.; Right Scapula-Anterior=*Scapula-Dextra-Anterior*, Sc. D. A.

*The Stages of Labor.*—Labor is divisible into three stages: (*a*) First stage—from the commencement of regular pains till complete dilatation of the os externum=*Stage of Effacement and*

*Dilatation.* (b) Second stage—from dilatation of the os externum till complete extrusion of child=*Stage of Expulsion*. (c) Third stage—from expulsion of child to complete extrusion of placenta and membranes=*Stage of the After-birth*.

*The Factors of Labor are :* (a) the Powers ; (b) the Passages ; (c) the Passengers.

#### MECHANISM OF LABOR.

From the study of a number of frozen sections, Veit<sup>42</sup> is led to believe that, in its descent through the pelvis, the rotation of the occiput forward ordinarily happens before the head reaches the pelvic floor and that the rotation is due to the inclined plane made by the obturator internus muscle together with the general configuration of the pelvis. In those cases in which rotation does not occur until the head reaches the pelvic floor, then the rotation is due to the well-recognized rule that the lowest part must rotate forward on account of the shape and inclination of the pelvic canal. Winter, however, denies the statement that the pelvic muscles have anything to do with the rotation, inasmuch as none of them have any prominence but merely fill up bony depression, thus making the walls of the pelvis smooth. He claims that there is no mechanism at the superior strait and that he has been able to pass an unusually large head through the superior strait of a normal sized pelvis without touching the walls. Olhausen believes that the rotation of the breech and body of the child above is a great factor in causing the rotation of the head.

Dr. Edward Reynolds,<sup>43</sup> of Boston, advances a theory which merits some consideration, viz., that so long as the membranes are unbroken and the “fore-waters” not cut off by the head, the general intra-uterine pressure has no share in the production of descent. So long as these conditions persist any descent which occurs must be referred either to the force of gravity or more commonly to that of direct contact between the breech and fundus. This condition may be produced by the escape of a large “bag of waters” from the uterus into the vagina, after which ordinary uterine retraction must result in direct contact.

After the rupture of the membranes, the general intra-uterine fluid pressure, like the force of gravity and that of direct contact,

is transmitted to the head mainly through the occipito-atlantoid articulation. Flexion is therefore to be explained in all cases by the concentration of the greater part of the propelling force upon the occipital end of the head.

Dr. Charpentier<sup>44</sup> states, in a paper on occipito-posterior positions of the head, that the conditions which favor or hinder a forward rotation of the occiput are so complicated that no fixed rule, based on any one factor, can be laid down. He calls attention, however, to one condition which seems to deserve especial mention. In a pelvis apparently normal, but which is slightly oblique (not so much as those described by Noëgelé, but asymmetrical), the promontory of the sacrum will be found to project forward and a little to one side. In such a pelvis the occiput naturally goes to the opposite side and rotation forward does not take place.

Dr. Foulis<sup>45</sup> believes that the downward position of the head, usually found after the seventh month, is caused by the constant extension of the child's legs, by means of which the round head is caused to glide over the curved inner surface of the uterus until the head becomes at last fixed at the superior pelvic strait, where it is kept by the extension of the lower limbs.

*Care of the Perineum during Labor.*—Dr. Fehling<sup>46</sup> criticises the method frequently practiced of pushing the head through the vaginal orifice by the fingers introduced into the rectum. Not only may injury be thus done to the rectum, but the danger of septic infection by the fingers in the rectum must certainly be increased. He advises, as a substitute, the pressing forward and upward during a pain against the space between the tip of the coccyx and anus. In this way, as also recommended by Ritgen, the perineum is protected and flexion and rotation are aided. Ruptures of the perineum usually occur owing to a premature extension of the head before the nape of the neck impinges under the pubic arch. If this happens, the occipito-frontal diameter instead of the sub-occipito-bregmatic stretches the perineum and causes the rupture. Should the perineum be in danger, Dr. William Duncan<sup>47</sup> insists on the great value to be derived from episiotomy. In a large number of cases in which this has been done, he has never seen the perineum give way, nor has he observed the slightest difficulty result from the operation, nor any failure of union after the insertion of one or two catgut sutures. Dr. Milne

Murray<sup>48</sup> dwells on the frequency of rupture being caused by the passage of the shoulders after the head has safely emerged.

#### THIRD STAGE OF LABOR.

The management of the third stage of labor has been the subject of no little discussion ever since Credé advised the expression of the placenta. The advocates of the expectant method of delivering the after-birth declaim loudly against the uncalled-for and, as they consider it, ill-advised procedure so strongly recommended by Credé; while, on the other hand, their own procrastination and unwarranted delay is as sharply criticised. In a most admirable paper by Dr. A. H. Freeland Barbour<sup>49</sup> the anatomy and physiology of labor is fully discussed. The third stage he considers to be a second labor in miniature. After the birth of the child the placenta is still, as a whole or in great part, attached to the uterine wall. During the contractions which always accompany the third stage the placenta is thrown into heights and hollows; but the heights do not necessarily mean an effusion of blood beneath, nor does a diminution of the placental site mean an absolute separation of the placenta. Dr. Jabobsen,<sup>50</sup> on the other hand, believes that the first after-pain peels off the greater part of the placenta, which then sinks into the uterine cavity by its own weight. The space behind is filled up with blood. Subsequent contractions complete the separation, and the placenta is forced downward into the lower uterine segment. Whichever of these views be correct, both writers agree on this point, that the separation of the placenta is as much a physiological process as the expulsion of the child, and as such does not demand interference. Jabobsen goes on to say, however, that in the majority of cases the vagina fails to expel the placenta, and therefore after its separation from the uterus has been physiologically brought about, its subsequent removal from the vagina is best accomplished by a depression of the uterus into the pelvis.

Drs. Charles,<sup>51</sup> of Liège, and Felsenreich<sup>52</sup> advocate the emptying of the uterus as soon as possible after the birth of the child; and the latter states that, out of 13,904 cases which occurred during four and a half years in Prof. C. Braun's clinic, Credé's method succeeded perfectly in all but 51 (.37 per cent.) cases.

Dr. F. Ahlfeld<sup>53</sup> believes that the practitioner should wait at

least an hour and a half before attempting expression, and Winckel,<sup>54</sup> in the Munich Hospital, allows two hours to elapse before resorting to Credé's method. Dr. Lazarewitsch<sup>55</sup> finds that, in two-thirds of all his cases, the expulsion of the placenta is delayed by the falling of the uterus to one side, thus forming an angle at the internal os. The application of his hand on the abdominal wall just above the symphysis pubis suffices to press the uterus into its normal position, when friction over the fundus and slight traction on the cord will at once accomplish the placental delivery. There can be no question but that, as Freund, of Strassburg, suggests, the supporters of Credé's method are gradually lengthening the time before using expression, while the opponents are decidedly shortening the period during which they will adhere to the expectant treatment. The expression of the placenta is best attempted after it has spontaneously separated from the uterine wall, and the chief sign that this has happened is an elevation of the uterus toward the umbilicus. Freund points out the fact that the uterus contracts, forcing the placenta into the lower segment, while at the same time it draws itself backward and upward. Whenever the delivery of the placenta is imperatively demanded, as in case of hæmorrhage, Credé's method should be used.

#### POST-PARTUM HÆMORRHAGE.

Dr. Schönberg<sup>56</sup> found that among the 2533 women who were confined (1876-84) in the Maternity at Christiana, post-partum hæmorrhage occurred fifty-one times, or in 2 per cent. of the cases. Four of these women were bleeders, and had suffered from hæmorrhage in previous deliveries. According to his opinion very little dependence can be placed upon the use of ergot, so far as any immediate effect is concerned. In cases of habitual bleeders the subcutaneous injection of ergotine, given just before the termination of the labor, seems to possess some merit as a prophylactic agent. A course of tonic treatment beforehand is, however, much more to be depended upon. The best treatment at the time of the hæmorrhage is the pressing of the anterior lip against the posterior with one hand in the vagina, while at the same time the other hand, grasping the uterus through the abdominal walls, brings it into a state of extreme ante flexion. In this way the uterine orifice is closed. As regards the use of vaginal injections,



the cold are to be preferred to the hot. Stimulants as a rule indirectly favor collapse. Benefit has followed the administration of common salt in drachm doses.

Dr. A. Dührssen<sup>57</sup> recommends in cases where ordinary methods of treatment have failed, packing the uterus with iodoform gauze. He was led to try this by his success in the similar treatment of miscarriages at the fourth and fifth month in which, after the uterus had been emptied, there was still a dangerous flowing. The danger of packing the uterus would seem to be the risk of infection; but this objection cannot hold good when iodoform gauze is used. By its use an immediate arrest of the hæmorrhage is effected. In three cases of severe post-partum hæmorrhage, where all other methods had failed, the packing of the uterus proved successful.

Dr. Gräfe<sup>58</sup> thinks that more attention should be paid to those hæmorrhages which not unfrequently occur after the lochia are supposed to have ceased, and which are too often neglected because, as a rule, they do not lead to serious consequences. Unquestionably these are evidences of subinvolution, and indicate oftentimes a lack of proper care in the management of the third stage of labor. He recommends the use of hot vaginal douches and the administration of ergot as the best method of hastening the process of involution.

*Sequelæ of Labor.*—Dr. L. Bochowick<sup>59</sup> points out that the separation of the abdominal recti muscles may lead to most distressing symptoms during labor and the subsequent convalescence. He gives the details of two cases. In both the labor was tedious, requiring violent straining on the part of the mother. Toward end of the first day of convalescence the following symptoms presented themselves:—violent colicky pains especially just below the navel; increasing meteorism; nausea and vomiting. The pulse and temperature remained normal. The symptoms were aggravated by the administration of a cathartic. A careful examination revealed the fact that the recti muscles were found separated but strongly contracted, and protruding between them could be felt the coils of the intestines. These being replaced the patients quieted down under the effects of opium and hot fomentations. Of course such extreme cases are rare, but Dr. Bochowick believes that less marked cases are not uncommon, the symptoms being

ascribed to after-pains, flatulence or constipation. This separation of the recti is the result of the stretching by the abdominal contents of all the abdominal muscles, but especially of the transverse, which transmit the strain to the linea alba and the intimately associated sheath of the recti. Clinically three grades of muscular disturbance are recognized. (1) Overstretching of the muscles, in which there is a loss of their elasticity, without, however, any essential change in their structure. This condition gives rise to a soreness of the abdominal muscles. (2) Simple abdominal flabbiness accompanied by diminished muscular tone and uniform atrophic condition of the transverse muscles, with little or no involvement of the recti. No results follow this, except tendency to flatulence and eructations, until the patient rises, when she complains of gastric uneasiness with a feeling of fullness after eating and of weight and pressure on the abdominal walls. (3) General relaxation of the abdominal walls, with atrophy of both the muscular and connective tissue elements. The symptoms are more marked than in the second class.

As a matter of treatment the use of the binder is of great value as a prophylactic. Extreme cases may require that strips of adhesive plaster be applied from below upward, getting their point d'appui from the spinal column. The application twice daily of the induction current is of benefit.

Dr. Desprès<sup>60</sup> calls attention to the paralysis of the abdominal muscles which sometimes follows confinement.

*Placenta.*—Dr. A. Ribemont-Dessaigues<sup>61</sup> advances a theory as to the formation of multiple placenta and the variations in the attachment of the funis, and draws a practical lesson for the accoucheur. Early in pregnancy the chorionic villi atrophy, except over a limited area, where they are generally uniformly distributed, and where they rapidly develop, thus forming a placental disk of varying shape and size. This process of atrophy may subsequently invade the villi of the placental mass, thus dividing it into two or more distinct disks.

In case of a single placenta the cord is usually central in its attachment; but considerable variety exists, as is appreciated by the terms "central," "marginal," "battledoor," and "membranous."

Taking it for granted that multiple placenta are formed from

the division of a single placenta by a late atrophy of the villi once connecting the separate disks, and that the original insertion of the cord was central, it is easy to see how modifications in attachment of the cord have been brought about. Multiple placentæ in single pregnancies are not extremely rare. In 6701 confinements which took place in the Maternity Hospital in three years, there were recorded 19 placentæ with one or more accessory lobes, making a proportion of 1 to 352 confinements.

The numerous illustrations which accompany the paper are exact representations of placentæ, and are drawn one-third the

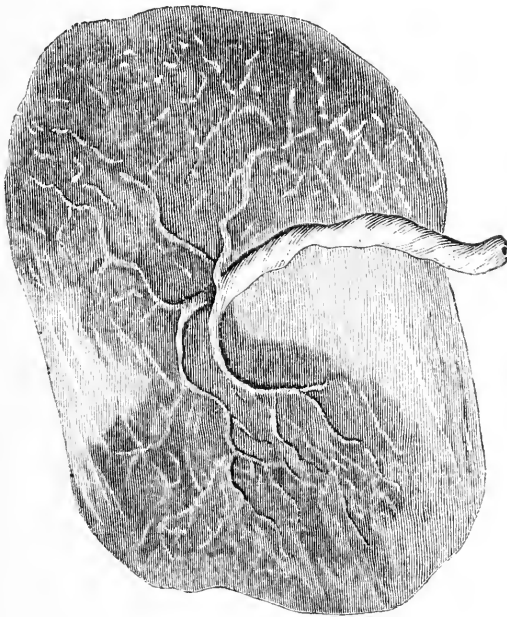


FIG. 1.—(*Annales de Gynécologie.*)

actual size. In examining them it is easy to understand the formation of the different types of multiple placentæ, and to explain them by the theory of a more or less extensive atrophy of the chorionic villi which made up the original single placenta. In figure 1 is shown a placenta presenting the first degree of atrophic process. It is in fact trilobed, the two larger lobes being connected by a small placental tuft, while in figure 2 the separation

is distinctly marked, the different portions being connected only by membranes and branches of the umbilical vessels. The two disks may be nearly of equal size, but as a rule it is found that the disk which is farther from the insertion of the cord is the smaller. In figure 3 there is a central attachment of the cord to the larger disk. The smaller disk is connected to the larger one by large vessels running over the membrane lying between the two disks. In this case it is easy to see how a rupture of the membranes, at a point between the lobes, would lead to a hæmorrhage which might prove fatal to the child. In figure 4 is shown a large placenta

attached by vessels to several small placentæ succenturiatæ. The clinical importance of multiple placentæ lies in the fact

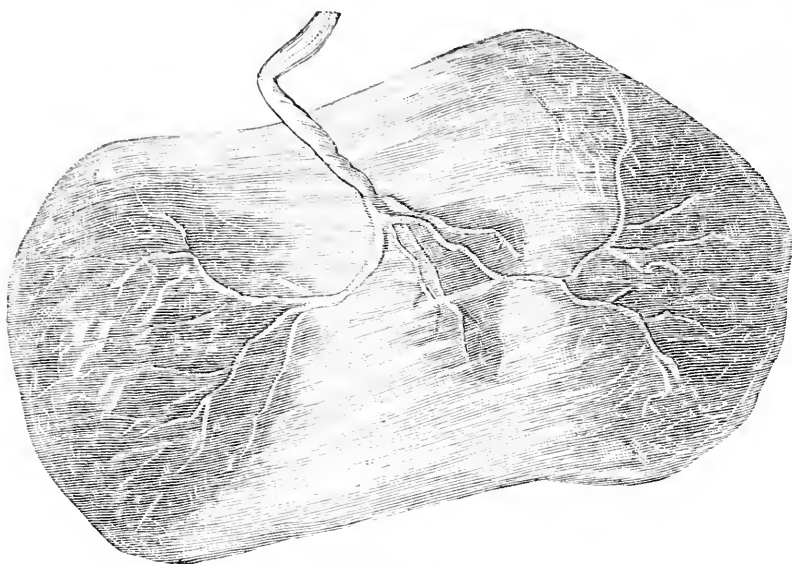


FIG. 2.—(*Annales de Gynécologie.*)

that one of these lobes may be retained in the uterus, while the other is expelled; and this accident is apt to occur if the attendant

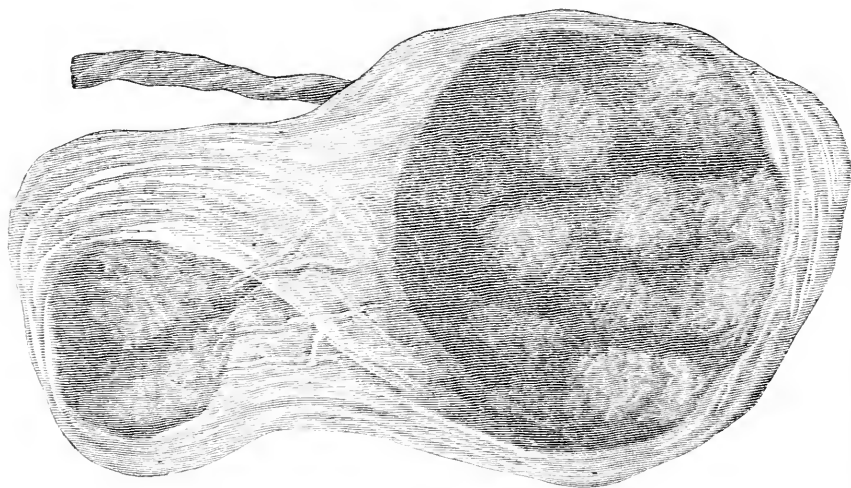


FIG. 3.—(*Annales de Gynécologie.*)

is in too great a hurry to remove the placenta. The practitioner should always carefully examine the placenta,—not only to see

whether the edges are intact, the material surface entire and a zone of membranes, of greater or less extent surrounding it, but also to notice whether there are vessels of varying size and number running across the membranes from the edge of the placenta and terminating in a rugged edge, showing conclusively that a placenta succenturiata has been left behind. It is to this unsuspected retention of a portion of a multiple placenta that a secondary hæmorrhage or an unexplainable septicæmia is due. It is by no means difficult to detect the presence of large vessels; but in order to be sure that small vessels do not escape the physician, he should carefully wash the membranes and examine them by holding them up to the light. In this way the presence of the smallest vessels leading from the placenta to a retained placental tuft will be detected.

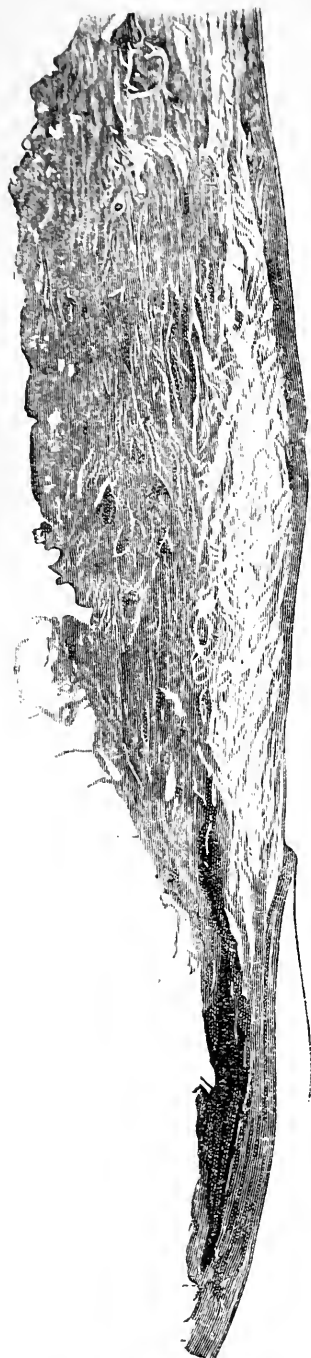
Dr. Ribemont-Dessaigues insists upon the necessity of never being in a hurry in extracting a placenta, and that its removal should be encouraged by friction over the uterus combined with gentle pressure on the fundus and a steady traction on the cord.

In case the subsequent examination shows that a placenta succenturiata has been left behind, it should at once be removed.

Dr. Levret's statement that the insertion of the umbilical cord in the placenta varies according as the latter is attached to the uterine wall, is denied by Dr. F. H. Champneys,<sup>62</sup> who gives the analysis of one hundred and eighty-eight cases, from which it appears that there is no relation between the insertion of the cord and the placental site.



FIG. 4.—(*Annales de Gynécologie.*)



(Edinburgh Med. Journal.)

Dr. H. Klotz<sup>63</sup> describes a decidual disease which is confined to the decidua serotina and is of the nature of an adenoma. It results in abortion and retention of the placenta for weeks and even months. In fact it is questionable whether the spontaneous expulsion of the placenta ever occurs. Even after the removal of the placenta it may reform. Cauterization of the placental site will alone prevent its recurrence. He gives the account of three cases in which there was no recurrence. The patient did not again become pregnant.

#### PLACENTA PRÆVIA.

Dr. D. Berry Hart,<sup>64</sup> from an examination of a frozen section of a uterus removed from the body of a multipara with placenta prævia, who had died immediately after delivery, has demonstrated, as shown in the drawing, that above the contraction ring the peritoneum is still adherent, while below it is separated from the uterus. The placenta was separated from this lower uterine segment, as the remains which are seen attached to the upper part clearly show. At the inferior border of this lower uterine segment comes the cervical mucous membrane. He considers that uterine contractions cause a wrinkling but never a separation of the peritoneum, while uterine stretching is followed by peritoneal separation. In placenta prævia, that portion which covers the lower uterine segment must be torn

off by the retraction of the uterine muscular fibres of the upper segment, which necessarily stretch those of the lower. He would therefore define placenta prævia as those cases in which the placenta is attached in part to the lower uterine segment, or in which it is so placed that a part of it falls, during labor, below the contraction ring.

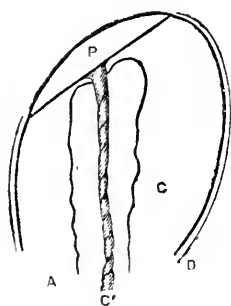
As the result of microscopical investigation of the anatomy of the white infarction of the placenta, Küstner<sup>65</sup> finds that these infarctions, taking place at the periphery of the placenta, are the result of a necrosis of the chorionic tufts, maternal blood and the neighboring decidua vera. The process does not involve the fetal portion of the placenta. He considers this pathological change as the basis of placenta prævia. The fetal side grows more rapidly than the maternal, extending upward and downward into the area of the decidua reflexa. The necrosis, keeping pace with it, the placenta finally reaches the lower segment of the uterus and becomes known as placenta prævia.

Dr. John F. Le Page<sup>66</sup> advances a novel theory as to the cause of placenta prævia. A Graafian follicle is ruptured artificially, as for example by sexual intercourse, and the ovum enters the uterus unprepared for its reception. When it reaches the lower segment the mucous membrane has attained that periodical condition which favors the arrest of the ovum and the result is a placenta prævia. He considers that the cause of the hæmorrhage is due to the fact that when the placenta is attached low down to a portion of the uterus, the growth of which is in an inverse proportion to its own, there must be, during the earlier months, a spreading out over a larger surface, while in the latter months, the placenta having attained its growth, there comes a tendency to the tearing of the cellular tissue, and consequently of the uteroplacental vessels, due to disproportionate development.

As regards the treatment of this dangerous complication of pregnancy, Lusk advocates the immediate delivery, if the pregnancy be advanced to the seventh month, as soon as the slightest hæmorrhagic symptom appears, as the next hæmorrhage may be the last. The necessity of prompt delivery is recognized by Breisky,<sup>67</sup> J. Braxton Hicks,<sup>68</sup> L. E. Neale,<sup>69</sup> Wyder,<sup>70</sup> Le Page,<sup>66</sup> Kelly,<sup>71</sup> Murphy,<sup>72</sup> Kidd<sup>73</sup> and many others. In support of his views, Neale quotes the statistics of Hofmierz, Behm and Lomer, by which it is

shown that the maternal mortality in 178 cases thus treated was only 4.5 per cent. In those cases in which labor, not having begun, was induced, there was a maternal mortality of 6.4 per cent. Murphy reports twenty-eight cases thus treated without a single death.

Drs. Robert Barnes,<sup>74</sup> Johnson,<sup>75</sup> and Le Page<sup>66</sup> recommend the artificial separation of the placenta from the lowest uterine zone, and the latter reports twenty-one cases thus treated, all the mothers being saved. The use of a tampon is strongly opposed by Wyder,<sup>76</sup> and J. Braxton Hicks, while Breisky thinks it may be used with a view of gaining time for the dilatation of the os uteri. If a tampon is used, a procedure not only dangerous but deceptive, Ahlfeld<sup>77</sup> advises that it be made of iodoform gauze with carbolyzed cotton packed around it, and Freund<sup>78</sup> expresses the opinion that it is only necessary to tampon the upper third of the vagina, thus avoiding the unpleasant effect of a complete tamponing of the vagina. When the first hæmorrhage has occurred before the advent of labor, and the termination of the pregnancy has been determined upon, the use of hydrostatic pressure, as recommended by Barnes, has been found useful to hasten the dilatation of the os uteri. Dr. Greder,<sup>79</sup> of Karlsruhe, objects, however, to the use of such a constant pressure, without reference to the presence or absence of uterine contractions. He believes that there is great danger of serious lacerations, which can be avoided by gentle and



(Zeit. f. Geb. u. Gyn.)

gradual dilatation, applied with reference to the pains. He recommends that an antiseptic laminaria tent be first introduced. Later a series of rubber bags filled with a weak carbolic solution should be used. During each pain a small quantity of the solution should be allowed to escape, the bag being refilled as the pain ceases. It is very easy to do this by means of a silver male catheter, to one end of which a rubber bag is attached, and to the other a stop-cock to which a rubber

syringe can be attached for the purpose of refilling the bag.

Dr. A. Auvard<sup>80</sup> reports a case in which during labor there was a rupture of the decidua and chorion, with an amniotic hernia. The amniotic sac thus formed descended, as shown in the diagram,



to the vulva, bringing about a complete separation of the amnion from the chorion. He questions whether in cases of placenta prævia it might not be possible to bring such a rupture about artificially, and thus the placental detachment be avoided and the hæmorrhage checked.

#### OCCIPITO-POSTERIOR POSITION.

Prof. A. A. Browne, of Montreal, Corresponding Editor of the *ANNUAL*, calls attention to the fact that, in cases of occipito-posterior positions of the head, a large number of writers favor the plan of non-interference until nature fails to accomplish the anterior rotation of the occiput. Such rotation failing, assistance is then rendered by the forceps or vectis and the labor terminated. By this time the patient has probably endured many hours of fruitless pain and is perhaps almost exhausted. A large number of cases rotate forward without artificial aid and even without much difficulty. There are, however, a certain number of cases (stated to be 4 per cent.) in which, after difficulty and delay, rotation does not take place. In such cases Dr. J. A. Temple<sup>82</sup> advises the following method of procedure: whenever he sees the patient early in labor and before the rupture of the membrane, or even after and before the head has descended very low into the pelvis, before the shoulders have engaged the brim, chloroform is given to quiet all resistance; the hand, being disinfected and well oiled, is cautiously introduced into the vagina and passed on until the head is reached. The head is then seized between the points of the fingers and thumb in the interval between a pain, and the occiput rotated forward. This is easily done, especially before the rupture of the membranes, and the case is then left to proceed as one of normal labor. Even after the head has engaged in the brim, it is easily done, providing the shoulders are above the brim; or, at least, if they have engaged in the pelvic cavity, or are not too firmly wedged there, much can be done by external palpation, chloroform, and patience.

#### FACE PRESENTATION.

The question of interference in a face presentation, especially in cases in which the chin is posterior, is still one about which very different views are held by obstetricians. Dr. De Soyre<sup>83</sup> advises the performance of version in all cases in which the head does not

readily engage. Ziegenspeck<sup>84</sup> favors the expectant treatment except in cases of threatened uterine rupture or when the chin, presenting posteriorly, fails to rotate. Where interference is demanded, forceps should be used when the presenting part is arrested at the superior strait and the chin is anterior. If, however, the head be above the superior strait, or can be moved backward, version is the preferable operation. Winter thinks it is better to delay the version until the os is dilated sufficiently to permit of an immediate extraction,—a statement to which Dohrn agrees, so far as the version is concerned; but he believes that it is safer to leave the delivery of the child to nature unless there are direct indications for immediate extraction. Dr. Thorn<sup>85</sup> recommends the conversion of a face presentation into an occiput, by the introduction of the hand into the vagina, as originally suggested by Schatz, and reports twenty-four cases in which he has done this successfully; in only two of them was it necessary afterward to use forceps. Dr. Volland<sup>86</sup> reports a novel method by which he successfully delivered a face presentation. The chin was posterior and well down in the pelvis. He introduced his hand into the vagina, grasped the lower part of the face and pushed the chin as far forward as possible, at the same time drawing it down. The face was then kept in this position and was expelled by uterine action. As to the danger of perineal lacerations in these cases, Dr. Torgler<sup>87</sup> believes that, notwithstanding the views of Fritsch, Winckel, Zweifel, Olhausen and Kleinwächter, face presentations predispose to tears of the perineum, and should be most carefully watched.

#### BREECH PRESENTATION.

Dr. J. S. Greene<sup>88</sup> reports two cases of breech presentations in which the legs were extended upward toward the face. The first was delivered by the use of the blunt hook and the second by version. With a view of lessening the percentage of still-born children, in cases of breech presentation, Porak<sup>89</sup> advises that an attempt should be made, during the ninth month, to perform external version, thus converting the breech into a head presentation. He considers that it is undesirable to attempt a change of position before the ninth month, inasmuch as breech presentations often correct themselves before the close of pregnancy. As regards the management of a breech case after the labor has begun opinions

differ widely. The Obstetrical and Gynecological Society of Paris has voted unanimously that in primiparæ external version is of great advantage and should always be tried, although the operation is difficult and much more dangerous than in multiparæ. In the latter the operation is much easier, but not so necessary. In either class of cases the attempt at version should be abandoned, if it is found necessary to use any degree of force. On the other hand, Pajot<sup>90</sup> opposes altogether the idea of attempting by external version the conversion of a breech into a head presentation. He believes that, especially in primiparæ, the operation is not only difficult but dangerous. Moreover, he considers the operation entirely uncalled for, inasmuch as the danger to the child from a breech presentation is not to be compared to the danger to the mother which would follow an attempt to perform external version. In these views Guéniot and Charpentier<sup>91</sup> coincide. With reference to the various methods recommended and the rules laid down for the extraction of the after-coming head, Dr. G. Winter<sup>92</sup> contributes a valuable paper based on a careful study of cases occurring in the Berlin Maternity. The three methods considered are the so-called Veit-Smellie, the Prague and the use of forceps. He claims that wherever the Veit-Smellie method has been fairly used, forceps have been abandoned. Nor has a living child ever been delivered by forceps when this method has been properly practiced. Manual extraction now meets all the indications which were formerly supposed to demand the use of the forceps. Perforation of the after-coming head is less frequently called for after the application of this method than after any other form of manual or instrumental interference. For the proper performance of this mode of delivery the middle finger should be introduced into the mouth while the index and ring finger are placed on either side of the nose. The forefinger and ring finger of the other hand should be applied at the nape of the neck. In this way the chin can be flexed upon the chest, while at the same time strong traction can be used upon the shoulders. One hand thus corrects the faulty mechanism, while the other favors the extraction of the head. Of course the objections urged against the Veit-Smellie method are that it is liable to tear the soft tissues of the mouth and break the inferior maxillary bone, or it may produce still more serious lesions of the spinal column. In answer to these objections Winter states that in

only 1 case out of 120 which he has examined was there any injury to the mouth, and in that one there was found a slight tear in the frænum of the tongue. There must always be some risk in any manual proceeding, but lesions to the spinal column must be extremely rare, and he was unable to find a record of any such injury. In extraction of the breech, especially after version, as soon as the posterior arm is born the back of the child should be turned to the front, and the head extracted by a firm, persistent application of the Veit-Smellie method, external pressure being applied over the occiput by a skilled assistant. If through negligence the chin be caught above the symphysis pubis the child should be delivered at once by forceps.

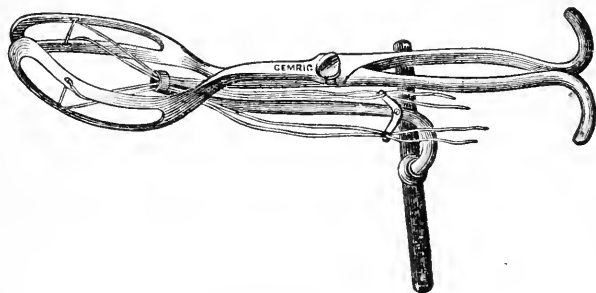
#### TRANSVERSE PRESENTATION.

As the result of a careful study of 310 cases of transverse presentations which have occurred in the Berlin Hospital, Dr. Winter<sup>93</sup> advises that, unless there is some special indication for a different method of procedure, the operation of version should be delayed until the os uteri is well dilated in order that the extraction of the child may immediately follow the version. In cases of placenta prævia, prolapse of the funis, septic infection, inertia uteri or danger threatening either the mother or child, it may be wise to do the operation earlier. In 236 cases in which version was immediately followed by extraction there were only 5 still-born children; while in 27 cases, in which the operation was performed before the os uteri was fully dilated, and the expulsion of the child was left to nature, 12 of the children were still-born. Dohrn, of Königsburg, does not agree with Winter, but thinks that time should elapse between the two operations, unless there are urgent reasons to the contrary. The spontaneous birth of the child, in his opinion, makes the prognosis much more favorable for both mother and child. In these views, Dr. T. Parvin,<sup>94</sup> of Philadelphia, coincides.

#### OPERATIVE OBSTETRICS.

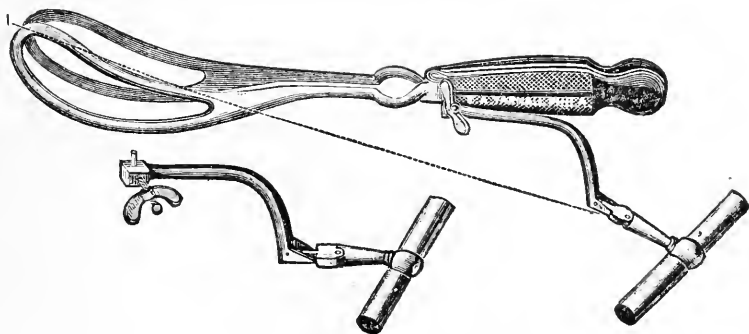
Several cases have been reported where excellent results have followed the use of the Poulet-Levret forceps. In this instrument, as shown by the drawing, the traction bar is connected with the forceps by tapes, which not only allows the forceps to move in the direction of the pelvic curve, but also to rotate to a certain degree with the head.

Dr. J. F. Baldwin<sup>95</sup> suggests that the tapes should be made of linen and not cotton, the latter breaking too easily. Linen tape, half an inch wide, will stand a strain of about one hundred and fifty pounds. Barnes' forceps<sup>96</sup> also allow free motion of the head and has an advantage over Tarnier's instrument, inasmuch as the traction part is wholly outside of the vulva, and consequently does not increase the danger of sepsis. They can also be used either with or without the traction part.



POULLET-LEVRET FORCEPS.

Dr. T. Lazarewitch, of St. Petersburg, exhibited before the last International Congress a pair of forceps which he called the "normal forceps." They have no pelvic curve, and the blades do not cross at the lock. A horizontal bar, passing through oval holes in the handles and fastened by a screw, constitutes the lock. The inventor claims that by their use a firm grasp of the head is effected without any undue pressure upon a limited part of the head.



BARNES' FORCEPS.—(London Med. Rec.)

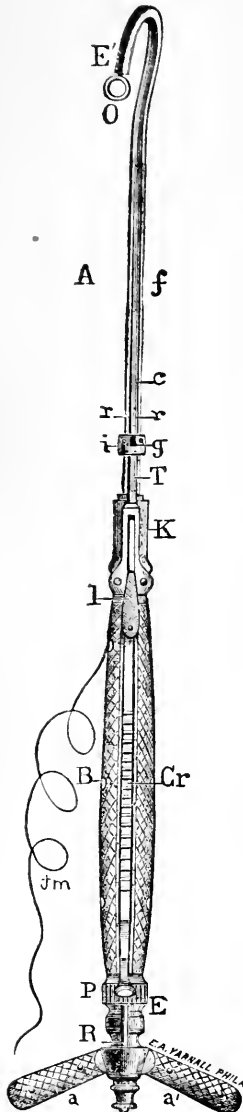
There is also less danger of the blades slipping. Dr. W. S. Stewart, of Philadelphia, also exhibited forceps having parallel blades.

Dr. J. K. Kelly,<sup>97</sup> in a review of 2823 cases of labor in which he had used forceps 272 times, favors the use of the straight forceps, inasmuch as by their use a much greater amount of force

can be used. In using the curved forceps a very considerable amount of the force applied is expended against the symphysis pubis.

The Obstetrical and Gynecological Society of Paris has by a vote decided<sup>98</sup> to hold to the former models of the forceps of Levret, Smellie, Simpson, Barnes, etc., believing that, though the axis-traction forceps of Tarnier, Poullet, Brens, Braun and Crozat may have some advantages, yet these are outweighed by their complications.

Dr. R. Lefour,<sup>99</sup> of Bordeaux, has constructed an instrument for decapitation by use of a wire noose. The instrument consists of two parts: Part A for holding the wire cord; Part B enclosing the mechanism, by which the noose is tightened. These two parts are firmly united by a joint K. The entire length of the instrument is 48 centimetres. Part A, bent in the form of a hook in its upper portion, is made of a flattened shaft of steel, with a deep groove on its surface. On the inside of this groove is a furrow,  $r\ r'$ , serving as a guide along which can be pushed a cover with a spring attachment for drawing it back R. This spring cover, sliding from one end E to the other E' of the instrument converts the metallic groove A into a complete tube.



LEFOUR'S DECAPITATING  
INSTRUMENT. — (*Gazette  
Hebd. de Bordeaux.*)

Part A of the instrument, the length of which is 22 centimetres, is straight for 17 centimetres from the joint K. At this point it is curved backward slightly and then strongly forward in the form of a hook. The length from the end of the hook to the point where the backward curve begins is 35 millimetres. The height of the arch of the hook, represented by a perpendicular "let fall" from the highest point of the arch to the middle of a line drawn from the end of the hook to the beginning of the backward curve, is 38 millimetres. On the back side, low down is a mortice,  $m\ m'$  opening the instrument when the spring

cover is removed. The part B of the instrument, 21 centimetres from the joint K, is a closed tube of steel, covered with wood for 16 centimetres. This serves as a handle for the instrument. This tube encloses a screw which is turned by the thumb piece a' so as to send the vice which holds the constricting wire up and down the back side of the handle. On the front of the handle there is also a groove corresponding to the preceding, in which runs a square rod T, which fits exactly the grooved surface of the instrument. This rod is worked by a handle P at its lower end, and is attached at its upper end to a smooth ring which fits closely around part A. This rod is plain in its upper part, but notched below, with the teeth directed downward in such a way as to be caught by a ratchet which automatically prevents the sliding back of the rod as it is pushed upward. Steel wire,  $7\frac{8}{10}$  millimetres thick, best met the conditions of tension and pliability. Ordinary piano-wire can be used. The wire is placed in the groove of the part of the instrument marked A and closed in by the spring cover R. The lower end of the wire comes out on the back of the handle at the mortice m m' and is fastened in one end of the jaws of the vice. The upper part of the wire is bent upon itself about a centimetre from the end and holds in its loop a round, soft rubber ring large enough to admit the tip of the index finger. This rubber ring is of the sort used to keep the ribs of an umbrella together around the handle. It is always open and yet is so pliable as not to injure the natural parts. Owing to its adjustment it is held in an upright position so as to be easily grasped by the examining finger.

The method of operating can be divided into four steps:—

(1) Introduction of the hook, which must go in transversely, parallel to and just behind the rami of the pubes until above the neck of the child. Then it should be turned so that the end of the hook is pointed downward and backward. Now if the handle of the instrument is raised and drawn upon a little it comes more nearly into the axis of the vaginal canal and nearer the vulva.

(2) Consists in attaching the two ends of the wire in the vice. The forefinger of the left hand is passed up for the ring. When it is seized it is drawn forward, and of course the cord attached to it. When outside the vulva, the ring is detached and the end

of the wire fixed in the vice. The two ends of the wire must be attached at the two ends of the jaws in order to have equal pressure and so be equally firmly held. The spring cover is now withdrawn.

(3) Consists in tightening the noose. The steel shaft T, is pushed by the handle P, carrying the ring g, i, until it reaches the backward curve in A. Now the handle a a' of the screw is turned. The thread of this screw passing through the vice P' and the end of the screw being fixed the vice must be brought nearer to E by every turn of the screw.

(4) Consists in withdrawing the instrument when the loop has cut through all the enclosed tissues, and in extracting the parts of the child.

The inventor gives the details of seven cases in which the instrument has worked successfully.

#### CRANIOTOMY. ABDOMINAL SECTION. INDUCTION OF LABOR.

Since Säger proposed in 1882 a modification in the operation known as Cæsarian section, the opponents of craniotomy have renewed their efforts to have all operations which are destructive to the child pronounced unjustifiable. The claim which they make is that, in these days of antiseptic abdominal surgery, the destruction of a living child is unwarranted; and they point, in justification of their claim, to the results obtained by Cæsarian section, ovaro-hystorectomy (Porro) and laparo-clytrotomy (Thomas). As to the comparative merits of the three operations, the opponents of destructive measures are sadly at variance, and good authorities still maintain that, under certain circumstances, the destruction of the living child is not only justifiable, but imperatively demanded. Even some of those who favor Cæsarian section object to all the modifications suggested by Säger<sup>100</sup> in his exhaustive monograph on the subject.

Gusserow<sup>101</sup> advocates the performance of Porro's operation only when the uterus is diseased, although he admits that it may be admissible in cases of general disease, where succeeding pregnancies would act deleteriously. In osteo-malacia, Kleinwächter<sup>102</sup> considers that this operation is especially indicated, owing to the generally favorable effect on the disease by sterilization. Gusserow admits that more extended observations may show that there is



danger of uterine rupture in succeeding pregnancies after the performance of Säger's operation (as has happened in some cases of old Cæsarian section). If statistics should show this, then more could be said in favor of Porro's method of operating. Prof. Simpson,<sup>103</sup> at the last International Congress, expressed the opinion that Porro's operation was only indicated when there was grave uterine disease which could be relieved at the same time. Dr. Martin<sup>104</sup> of Berlin, considered that either Cæsarian or Porro's operation were justifiable when a living child cannot be born. The former operation is of course preferable, inasmuch as it does not remove the hope of a subsequent pregnancy. Dr. Spencer Wells thinks that Porro's operation involves less danger to the mother than the Cæsarian section, which leaves the emptied uterus within the abdominal cavity.

The results of Cæsarian section as modified by Säger have certainly been remarkably successful. In a letter just received from Dr. Robert P. Harris, of Philadelphia, the statistics of the first fifty cases in chronological order in Europe and the United States are given as follow :—

|   |   |   |   |   |   |   |   |   |    |
|---|---|---|---|---|---|---|---|---|----|
| Women saved,                                  | . | . | . | . | . | . | . | . | 35 |
| Children extracted alive,                     | . | . | . | . | . | . | . | . | 46 |
| Women lost,                                   | . | . | . | . | . | . | . | . | 15 |
| Children extracted dead,                      | . | . | . | . | . | . | . | . | 4  |
| 31 operators.                                 |   |   |   |   |   |   |   |   |    |
| Operations of Continental Europe exclusively, | . | . | . | . | . | . | . | . | 50 |
| Women saved,                                  | . | . | . | . | . | . | . | . | 40 |
| Children extracted alive,                     | . | . | . | . | . | . | . | . | 48 |
| Women lost,                                   | . | . | . | . | . | . | . | . | 10 |
| Children extracted dead,                      | . | . | . | . | . | . | . | . | 2  |
| 31 operators.                                 |   |   |   |   |   |   |   |   |    |

Dr. G. Widmer<sup>105</sup> reports an extremely interesting case of a woman, thirty-six years of age, who had been delivered twice by craniotomy and once by embryotomy for marked pelvic deformity. Säger's operation was performed at full term, both mother and child doing well. Dr. Aisenstatt,<sup>106</sup> of St. Petersburg, gives an account of three women who performed Cæsarian section upon themselves. Two of them recovered.

As regards the details of the operation, Zweifel, Leopold and Lébédoff<sup>107</sup> strongly oppose Säger's idea of resecting a portion of the uterine muscle, with a view of approximating the serous edges. Zweifel agrees with Odhausen that the peritoneal edges, when

brought together, do not always unite and strengthen the uterine cicatrix. Prof. Leopold,<sup>108</sup> of Dresden, recommends that before opening the uterus it should be brought outside of the abdomen and the abdominal walls closed by means of temporary sutures. He commends<sup>109</sup> the use of catgut ligatures as prepared by Dr. Mikulicz. The fresh catgut, after soaking for forty-eight hours in a 10 per cent. solution of carbolyzed glycerine, is placed for five hours in a half per cent. solution of chromic acid. They can be preserved in absolute alcohol. Dr. Champneys<sup>110</sup> calls attention to the fact that the uterine souffle is no guide whatever to the placental site, the sound being often heard after the placenta has been removed and in cases of fibrous tumors.

Dr. W. D. McKim<sup>111</sup> prefers laparo-elytrotomy in Cæsarian section in those cases in which the obstruction to the delivery lies below the cervix uteri. He reports fourteen cases which resulted successfully for the mother in seven and for the child in nine. One of the children was found to be putrid at the time of the operation. Dr. Breisky<sup>112</sup> warns against the too hasty decision in favor of Cæsarian section, since it is impossible to measure the pelvic diameters with mathematical precision, to judge of the exact size of the foetal head or to foresee whether in a doubtful case the pains could adapt the head to a given space. The statement made by Chiari that children conform in size to the mother's parts, is doubted by Lemièrre, who quotes the results of La Torre's examination of 1325 women with deformed pelves, and in whom it was found that the foetal development was the same as in well-formed women.

Dr. J. Taber Johnson,<sup>114</sup> who formerly held that craniotomy should be the operation of election and Cæsarian section that of necessity, now advocates the opposite statement.

Dr. Robert Barnes<sup>115</sup> favors Porro's operation in cases of extreme pelvic deformity, while Cæsarian section is indicated in those cases in which the malformation is less marked.

As regards the management of labor in cases of flattened pelves, Dr. Winter<sup>116</sup> gives an admirable analysis of 632 such cases, as the result of which he states that there are but two methods of treatment,—the expectant, which usually results in the use of high forceps or version, and the active, which consists of an early version and rapid termination of the labor. He advises

the former method in cases of primiparæ, and the latter in multiparæ. The former method gave an infant mortality of 7.5 per cent., the latter 11 per cent. Dr. Longaker<sup>117</sup> does not believe that a contraction of the pelvis itself is a sufficient reason for the performance of version, inasmuch as the axis-traction forceps will be found sufficient for the extraction of a head through a flat pelvis with a conjugate of three inches, or even a trifle less, and through a conjugate of a generally contracted pelvis of at least  $3\frac{1}{2}$  inches. In flat pelves, with a conjugate of not more than  $3\frac{1}{4}$  inches and not less than  $2\frac{3}{4}$  inches, premature labor should be induced.

Dr. A. Pinard<sup>118</sup> strongly recommends the operation of basiotripsy by means of Tarnier's basiotribe, which consists of two crushing blades, fenestrated, one fitting into the other. The two blades, between which is adjusted a perforator, are brought forcibly together by a screw-clamp. In cases of version, where it has afterward been found impossible to deliver the head and the antero-posterior diameter of the superior pelvic strait exceeds 1.6 inches, this operation offers far better results than Cæsarian section, laparo-elytotomy or Porro's operation. In proof of these statements he gives the results of 49 cases, all of which resulted favorably for the mother. In the light of these figures he considers basiotripsy an operation not of choice but of necessity, to which one is forced in extreme narrowing of the pelvis. The addition of the perforator prevents the slipping of the blades, as so frequently happens with the cephalotribe.

Premature labor, in cases where the pelvic deformity is not too great, has been brought more prominently to the attention of the profession by the recent experiments which have been made in France with the incubator. The new methods have, according to Doléris,<sup>119</sup> reduced clinical viability to almost six months, and the danger which formerly threatened the life of the premature baby has, as Dr. La Torre<sup>120</sup> shows, been greatly lessened.

As regards the value of electricity as a means of inducing labor, Dr. Brühl<sup>121</sup> reports seven cases which seem to show that, under the action of electricity, the os uteri will dilate to a certain extent, but that uterine action will not be excited; and Litschkus<sup>122</sup> gives the account of two cases, in one of which no result was obtained, and in the other the labor began after a period of eight days.

During the past ten years labor has been induced thirty-one times in the Berlin Hospital. In twenty-nine of them, as reported by Panienski,<sup>123</sup> a bougie was introduced within the uterine cavity, and in two cases the membranes were ruptured. In the cases in which a bougie was used the labor started up in from six hours to sixteen days after the introduction of the bougie. In two of the cases pilocarpin was first used, but unsuccessfully. Dr. Koppe,<sup>124</sup> of Moscow, advises a separation of the chorion from the lower segment of the uterus by the fingers, while at the same time the cervix is stretched, the fundus uteri being grasped firmly with the operator's other hand. In a case in which he thus operated, labor pains began almost immediately. Dr. L. Gauvey<sup>125</sup> believes that very little reliance can be placed on the use of hot vaginal douches.

The practical question is, does abdominal surgery do away with craniotomy, as Credé has recently declared it did? Statistics are deceptive and Dr. S. Gottschalk<sup>126</sup> very fairly takes exception to Credé's method of comparing results. On one side are operations, performed by experts under the most favorable surroundings, giving a maternal mortality of 7.1 per cent.; on the other side a vastly greater number of craniotomies, the majority of which were done under the most adverse circumstances and in what might be called preantiseptic times. To offset the statistics of Credé, Gottschalk gives the record of one hundred cases of craniotomy with a mortality of only 3 per cent. Caesarian section may be the operation for hospitals with skilled assistants, but it is not yet proven to be a substitute for craniotomy under all circumstances. These are the views generally reflected by the German writers; and Dr. Fancourt Barnes,<sup>127</sup> writing from England, affirms that "during the past year English obstetricians have been much engaged in discussing the merits of the Caesarian section as against the demerits of craniotomy. No doubt the remarkable impetus which has been given to all kinds of abdominal sections by the enterprise of Mr. Lawson Tait, has largely contributed to the movement in favor of Caesarian section in preference to craniotomy. Of course if it were possible for the Caesarian section to be performed at the right moment in the right cases, something might be said in its favor. In our opinion, however, it is incredible that any practical obstetrician can seriously urge the abdominal section

when all his experience of difficult midwifery must have proved to him that it is too late to resort to this measure when he is called to the bedside of the patient.

“In all large cities the cases of pelvic deformity which call either for craniotomy or Cæsarian section are to be found amongst the lower classes, and no one who has had to deal with them can fail to be aware of the fact that he is never called upon to interfere until things are in the last stage. This being the case, it seems to us to be pure folly to talk of performing the Cæsarian section in this class of the community when in ninety-nine out of a hundred cases the physician could only arrive many hours after labor had set in, and in all probability long after the membranes had ruptured.”

Dr. Doléris,<sup>128</sup> Corresponding Editor, states that the French obstetricians only accept abdominal surgery as a necessity, not placing the method on the same footing with craniotomy since the former risks both lives and places the child's life on a par with that of the mother. The excellent results obtained in the French hospitals justify these views, inasmuch as the mortality is practically none after the operations of cephalotripsy and basiotripsy.

In case the mother dies during pregnancy or labor, or is dying, the child being still alive, there can be no question that Cæsarian section should be performed. As a rule it is rarely successful after the death of the mother, and Manasse,<sup>129</sup> of Berlin, places ten minutes as the longest time after death that a living child has been saved by Cæsarian section, although Breslau extracted a child fifteen minutes after death which lived several hours, and Puyler reports a case of one which lived though removed from the uterus twenty-three minutes after the death of the mother. From the records of 510 cases of Cæsarian section collected by Prengreuber, it appears that 91 children were extracted, of which number 25 were resuscitated. It being a well recognized fact that the temperature of the fœtus is higher than that of the mother, Manasse concludes, from the consideration of a number of cases in the clinic of Prof. Gusserow, that Cæsarian section is not successful when performed after the mother has died from a disease which resulted fatally, with high temperature. Dr. Koppe, of Moscow, urges the importance of inducing labor, in the interest of the child, in all cases in which the mother's life is

hopeless and death apparently a question of a few days. In a case of tubercular laryngitis in which he induced labor, the child was saved and the mother's life prolonged several weeks, death finally being due to failure of the heart's action. The birth of the child relieved at once the dyspnœa and acute suffering of the mother.

#### SYMPHYSEOTOMY.

Morrisani<sup>130</sup> contributes a valuable article in which he presents the advantages to be derived from the operation of symphyseotomy in cases of deformed pelves where the antero-posterior diameter of the superior strait is between 2.64 and 3.19 inches. The operation should be performed early in the labor, but is of course contra-indicated if the fœtus is dead or any other operation, such as forceps or version, has been tried and failed. He gives the following statistics of a large series of cases which he has been able to collect:—

| YEARS.              | CASES. | RECOVERIES. | DEATHS. | LIVING CHILDREN. |
|---------------------|--------|-------------|---------|------------------|
| 1777-1866 . . . . . | 80     | 52          | 28      | 35               |
| 1866-1880 . . . . . | 50     | 40          | 10      | 41               |
| 1880-1886 . . . . . | 18     | 10          | 8       | 13               |
|                     | 148    | 102         | 46      | 89               |

In the cases reported from 1866 to 1880 the indications for the operation were strictly observed, and it will be seen that the results were very satisfactory.

#### PRECIPITATE LABOR.—RUPTURE OF THE FUNIS.

A series of experiments have been performed by Dr. Budin<sup>131</sup> with a view of ascertaining the amount of force necessary to rupture the umbilical cord. He found that the laceration was due as much to the manner in which the force was applied as to the amount. Force, which was steadily applied without rupturing the cord, would break it when suddenly applied. The quality and disposition of the funis also made a difference. The amniotic sheath in which the vessels are packed yields first, then the arteries and finally the vein. The twisted cords rupture more easily than the straight ones. Hæmorrhage from the ruptured cord is extremely rare. Dr. Budin was led to make these experiments from

the fact that he has had in his own practice two cases in which a spontaneous rupture of the funis took place by the mere force of the uterine contractions, aided of course by the abdominal muscles. The patients were lying down at the time, and a subsequent examination of the cord could detect nothing noticeable, either as regards its length or structure. In his report of these cases Budin also cites a similar case reported by Schatz and one by Duprey. A case of precipitate labor is given by Chambrelant<sup>132</sup> in which, before the patient could be properly placed in bed, the child was born and fell to the floor, the cord being broken close to the placenta. The curious features of this case were the uninjured condition of the child and the fact that, although the woman was a primipara and the labor so rapid and unaided, the perineum was intact.

Dr. Gustav Koch<sup>133</sup> examined the records of 3775 cases of labor which occurred at Stuttgart, with reference to the frequency of precipitate labors and their results. He found 37 cases, or a percentage of .98, which is less than reported by Winckel, whose estimate is 1.7 per cent. Post-partum hæmorrhage occurred six times, but only once was it profuse. In seven of the cases there was a slight laceration of the perineum. The interesting feature of his report relates to the funis, which was ruptured in six of the cases. In one case a rupture of the vessels close to the umbilicus and also near the placental insertion took place, without, however, tearing the amniotic sheath.

In another case the labor occurred while the patient was at stool, the cord breaking and the infant suffocating in the well below. Besides a ragged laceration in the middle, there were three clean tears, as if made by a sharp instrument, on the foetal side. Two of these went through the amnion and the third through one of the arteries and the vein. The reports of these different observers are extremely interesting, when viewed from a medico-legal standpoint. The question might easily arise as to whether it would be possible for the rupture of a normal cord to occur with the patient in bed, no other force being employed than that occasioned by the rapid and forcible expulsion of the fœtus. In other words, in case a ruptured cord is found under such circumstances, must the mother have broken it? The report of these cases clearly show that such need not necessarily be the fact.

## PROLAPSE OF THE FUNIS.

Two cases of procidentia of the cord, before the advent of labor, are reported by Maygrier.<sup>134</sup> The cause was a premature rupture of the membranes as the result of constipation. Both children were subsequently born dead. He advises as the treatment in these cases, the placing of the woman in the knee-chest position. A catheter with the stillette should be used. Having passed a loop around the cord the former should be attached to the stillette through the opening in the catheter and the cord can then easily be carried within the os uteri and the stillette withdrawn. The operation is reported as difficult, but the writer of this review has never found any difficulty if the patient be placed on her back. It is well also to leave the catheter in position for some time after withdrawing the stillette. The result is often the induction of the labor, which is the best thing which can happen under the circumstances. The operation has been several times successful at the Boston Lying-in Hospital.

## PROTRUSION OF THE UTERUS DURING LABOR.

Dr. Francisco,<sup>135</sup> of Madrid, reports the case of a well-developed primipara, twenty-four years of age whose labor had been progressing for some time when suddenly, after a very severe pain, the whole uterus was extended from the vulva with complete eversion of the vagina. The os uteri had dilated to about the size of a quarter of dollar. Shortly afterward, as the result of two pains, a well-formed female child was born. The cervix was badly lacerated bilaterally. The uterus and vagina were replaced and the convalescence was normal. A similar case is reported by Dr. M. O. Carroll,<sup>136</sup> St. Vincent, West Indies, in which the pains were very severe and the uterus was suddenly protruded several inches outside of the vulva. By forcibly dilating the os uteri he was enabled to deliver with the forceps and replace the uterus. The woman in this case also made a good recovery.

## RUPTURE OF THE UTERUS.

F. Kroner,<sup>137</sup> of Breslau, reports the results of forty-seven cases of ruptured uterus treated without drainage, which he has collected from medical literature. Nineteen were complicated with



lesion of the peritoneum, and of these eight recovered. Ten were uncomplicated and five recovered. In the remaining eighteen, no reference whatever is made to the condition of the peritoneum, and nine recovered. The total gives twenty-five fatal cases and twenty-two recoveries. Of the fatal cases only eight lived more than twenty-four hours after the rupture had taken place. Hence drainage could have had but little influence on the great majority of the fatal cases.

Dr. Malcolm McLean<sup>138</sup> believes that in all cases of incomplete rupture delivery per vaginam should be attempted. Even if it failed, a subsequent laparotomy was rendered necessary. In case the rupture occurred before the dilatation of the cervix uteri was complete, or the liquor amnii had escaped into the abdominal cavity, laparotomy or Porro's operation is demanded.

Dr. C. C. Lee<sup>139</sup> advocates abdominal section in all cases in which the head cannot be readily reached with the forceps or version readily performed. Dr. W. T. Lusk thinks that the chances are much more favorable for the mother if abdominal section is resorted to whenever a part of the child has escaped into the abdominal cavity.

#### LABOR COMPLICATED BY UTERINE MISPLACEMENT.—TUMORS.

Not unfrequently the labor is delayed by an anteflexed or anteverted condition of the pregnant uterus. Dr. Reamy<sup>140</sup> calls the attention of the profession to the necessity of recognizing this cause of delayed labor and early to correct such misplacements. The suspension of active efforts on the part of the patient will often relax the recti muscles and a change of position, such as the dorsal decubitus, the elevation of the hips, or the application of an abdominal swathe will be sufficient to correct the difficulty.

Dr. Auvar,<sup>141</sup> of Paris, reports the case of a confinement complicated by the presence of a soft, non-fluctuating fibroid in the posterior cul-de-sac. The presentation was a breech. He attempted in vain to push back the tumor out of the pelvic cavity. As the labor went on the head progressed and suddenly the tumor disappeared up above the pelvic brim.

Dr. J. Bárzony<sup>142</sup> treats at great length of the relation of ovarian, uterine and pelvic tumors as complicating pregnancy and labor. Ovarian tumors, diagnosed during pregnancy can develop

after the termination of the pregnancy. In cases where there is disease of both ovaries, conception may occur, provided only that a small portion of healthy tissue be left. Small tumors are usually first detected during the second half of pregnancy. They generally grow rapidly in consequence of the hyperæmia of the genitals. Benign growths may suddenly assume a malignant character. Even small tumors in the pelvic cavity may offer a hindrance to the labor which is very difficult or even impossible to overcome. Large tumors higher up, by pushing the uterus to one side, exert a most disturbing influence on the uterine contractions and the direction in which the expellent forces act. The expectant treatment is justifiable in the case of small tumors of slow growth, which are detected toward the end of pregnancy, but in all other cases operative interference is demanded. The artificial induction of labor is liable to produce hæmorrhages into the tumor ending in suppuration. It is indicated, however, when the tumor occupies the pelvic cavity in such a way as to offer an absolute hindrance at the time of labor. The extirpation of the tumor, if it be possible, exerts in the majority of cases no unfavorable influence on the subsequent course of the pregnancy. The treatment during the labor depends of course on the size, location and character of the tumor. In cases of ovarian tumors, the removal is best effected during the first half of pregnancy, inasmuch as later the parts are tenser, the ligaments more vascular, and the pedicle harder to treat.

Dr. Pajot<sup>143</sup> reports a case where a woman was confined in the Maternity Hospital two years after the cervix uteri had been removed for cervical elongation. The labor was normal.

#### POST-MORTEM FETAL EXPULSION.

Dr. Korsch<sup>144</sup> gives the details of the burial of a woman who died four hours after an accident. Eight days later the tomb was opened and a newborn infant was found at her feet. The expulsion of the child had evidently been effected by the gas developed by putrefaction.

#### REFERENCES.

1. Lyon Méd. 2. Deut. Med. Woch. 3. Gaz. des Hôpitaux. 4. Berlin Klin. Woch. 5. Deut. Med. Zeit. 6. Jour. de Méd. de Paris. 7. Am. Jour. Med. Sci. 8. Deut. Med. Zeit. 9. Rep. of Corr. Editor. 10. La Semaine Méd. 11. l'Union Méd. 12. Edinburgh Med. Jour. 13. Cent. f. Gyn. 14. Edinburgh Med. Jour. 15. Deut. Med. Zeit. 16. Med. News. 17. Arch. d'Obst. et Gyn. 18. Med. News. 19. Cent. f. Gyn. 20. Berlin Klin. Woch. 21. London Med. Rec. 22. l'Union

Méd. 23. Fortschr. der Med. 24. Arch. f. klin. Chir. 25. Cent. f. Gyn. 26. Arch. f. Gyn. 27. Arch. f. Gyn. 28. Cent. f. d. Med. Wissen. 29. Lancet. 30. Revue de Thérap. 31. Boston M. and S. Jour. 32. Med. News. 33. Cent. f. Gyn. 34. London Med. Rec. 35. Med. and Surg. Rep. 36. Brit. Med. Jour., 1885. 37. Jour. Am. Med. Assoc. 38. An. de Gyn. 39. Gaz. des Hôpitaux. 40. Canadian Pract. 41. La Semaine Méd. 42. Cent. f. Gyn. 43. Am. Jour. Obst. 44. La Semaine Méd. 45. Edinburgh Med. Jour. 46. Cent. f. Gyn. 47. Lancet. 48. Edinburgh Med. Jour. 49. Edinburgh Med. Jour. 50. Cent. f. Gyn. 51. An. de Gyn. 52. N. Y. Med. Jour. 53. Berlin Med. Woch. 54. N. Y. Med. Jour. 55. Med. and Surg. Rep. 56. Cent. f. ges. Ther. 57. Cent. f. Gyn. 58. N. Y. Med. Jour. 59. Arch. f. Gyn. 60. Med. Press and Circular. 61. An. de Gyn. 62. Brit. Med. Jour. 63. Cent. f. d. ges. Ther. 64. Edinburgh Med. Jour. 65. Virchow's Arch. 66. Provincial Med. Jour. 67. Cent. f. d. ges. Ther. 68. Brit. Gyn. Jour. 69. Obst. Gaz. 70. An. de Gyn. 71. Practitioner. 72. Lancet. 73. Brit. Gyn. Jour. 74. Lancet. 75. Maryland Med. Jour. 76. An. de Gyn. 77. Deut. Med. Woch. 78. Cent. f. Gyn. 79. Cent. f. Gyn. 80. Zeit. f. Geburt. u. Gyn. 81. Rep. of Corr. Ed. 82. Canadian Pract. 83. Brit. Gyn. Jour. 84. Wien. Med. Woch. 85. Cent. f. Gyn. 86. Cent. f. Gyn. 87. Cent. f. Gyn. 88. Boston M. and S. Jour. 89. London Med. Rec. 90. Le Practicien. 91. Nouv. Arch. d'Obst. et de Gyn. 92. Zeit. f. Geburt. u. Gyn., 1886. 93. Zeit. f. Geburt. u. Gyn. 94. Jour. Am. Med. Assoc. 95. Columbus Med. Jour. 96. London Med. Rec. 97. Edinburgh Med. Jour. 98. Rep. Dr. Doléris, Corr. Ed. 99. Gaz. Hebdom., Bordeaux. 100. Der Kaiserschnitt bei Ut., etc., 1882. 101. Berlin Klin. Woch. 102. Le Progrès Méd. 103. Med. Register. 104. Med. Register. 105. Arch. f. Gyn. 106. Gaz. de Gyn. 107. Arch. f. Gyn. 108. Med. Press and Circular. 109. Deut. Med. Woch. 110. Brit. Med. Jour. 111. N. Y. Med. Jour. 112. Wien. Med. Woch. 113. Jour. des Sci. Méd. de Lille. 114. Jour. Am. Med. Assoc. 115. Brit. Med. Jour. 116. Deut. Med. Woch. 117. Med. News. 118. l'Union Méd. 119. Rep. of Corr. Ed. 120. Développement du fœtus chez les femmes, etc., Paris, 1887. 121. Arch. f. Gyn. 122. Med. News. 123. Lancet. 124. Cent. f. Gyn. 125. Revue de Thérap. 126. Deut. Med. Zeit. 127. Rep. of Corr. Ed. 128. Rep. of Corr. Ed. 129. Jour de Méd. de Paris. 130. Le Progrès Méd. 131. Le Progrès Méd. 132. Jour. de Méd. de Bordeaux. 133. Deut. Med. Zeit. 134. Le Progrès Méd. 135. Lyon Méd. 136. Med. Press. 137. Jour. Am. Med. Assoc. 138. Med. Record. 139. Trans. Am. Gyn. Soc. 140. Jour. des Sci. Méd. de Lille. 141. l'Union Méd. 142. Cent. f. Gyn. 143. London Med. Rec. 144. An. de Gyn.

[Undated references apply to journals published in 1887, and original articles can be found by consulting the indexes of the respective publications.]

## PUERPERAL DISEASES.

By THEOPHILUS PARVIN, M.D.,

PHILADELPHIA.

---

### PUERPERAL FEVER.

THE so-called puerperal fever has brought forth some valuable scientific contributions, relating chiefly to its etiology and to its prophylaxis. We first give the views of Dr. Robert Barnes, reported by our Corresponding Editor, Dr. Fancourt Barnes, of London:—

To illustrate the history of puerperal fever by studying its relation to meteorological conditions, Dr. Robert Barnes shows by carefully constructed tables the curves of prevention of puerperal fever, scarlatina, erysipelas, and fevers of all kinds in London, worked out for two periods, namely, thirty years, 1845–74; and ten years, 1875–84. In both periods the curves are almost identical, thus strikingly confirming each other, and showing that all these fevers are most prevalent from October to March. They bear strong evidences of the truth of Barnes' theory of the compound nature of puerperal fever, and of the falseness of the arbitrary doctrine that puerperal fever is nothing but septicaemia. Why the former is more prevalent when women are delivered in the autumn, winter, and spring, is because the atmosphere is then often cold and damp, and the diffusion and metabolic power of the air is so impaired that the excretions of the puerpera are relatively arrested. This implies that the disintegrating waste tissue is retained in the body, and may either produce simple "excretory or autogenetic fever," or may form a favorable culture-ground for any septic material generated in the uterus: endogenetic fever; or imbibed from without: heterogenetic fever. This theory not only embraces the so-called "septicaemic" theory, but goes beyond. One of the recommendations set forth is to assimilate the meteorology of the lying-in room or domestic meteorology with the healthy external or natural meteorology. It also includes a rational

application of known antiseptic methods, but warns against trusting to these alone. The memoir is a timely caution against placing exclusive trust in one method of action based upon a bigoted devotion to one etiological factor, and is a logical plea for a broad system of action resulting from the recognition of all the factors which clinical observation shows to be concerned in the history of puerperal fever.

In the Hunterian oration by Dr. Galabin<sup>1</sup> the author states that the application of the germ theory to puerperal fever has caused the division into two classes, autogenetic and heterogenetic; and that "there are three possible sources of poison in the body of the puerperal woman:" (1) 'The poison may be produced within the body itself, and he accepts Dr. Barnes' designation of endogenetic toxæmia, but knows of no evidence to prove that this can by itself produce a febrile disease. (2) "A chemical poison—the so-called sepsin—may be produced by the action of the bacteria of decomposition, and may be absorbed into the system." But a little while afterward he, with the utmost frankness, says it is hardly ever possible clinically to decide that any case belongs purely to this variety. In regard to the third variety "of sources of poison in the human body," which, as will be seen, is not in the human body at all, but comes from the exterior, we shall give his exact words, for they express, in our opinion, fundamental truths,—truths some of which at least are essential for the rational explanation of puerperal fever. (3) "Parasitic organisms may gain access to the body and multiply in the tissues, in the blood or the lymphatics, or in all of them. This constitutes septic infection, or septicæmia proper, and is the variety of puerperal fever upon which almost the whole interest is concentrated, for it is hardly ever possible to be certain that a given case is not of this nature; and without this class comprises the great majority of cases which occur, including many, if not all, of apparently local affections, such as pelvic cellulitis, and phlegmasia dolens, which have not generally been included under the title of puerperal fever." Laying aside the contradiction between "sources of poison in the body," the statement that "parasitic organisms may gain access to the body," and the half qualified manner in which he speaks of the almost exclusively extrinsic source of the puerperal poison, Dr. Galabin seems almost ready to recant his faith

in puerperal polytheism or polydiabolism, and worship at the single shrine of heterogenesis. There is no proof that endogenous toxæmia causes a febrile disease, and we can hardly ever decide clinically that a case of puerperal fever has the etiology spoken of in the second class. Now, if these statements are true, why not throw the first two varieties to the winds, or remand such etiologies to the cabinets of ancient curiosities, and come to admit the unity of the puerperal poison, and also admit that this poison is not the product of spontaneous generation in the uterus, the vagina, or any other organ of the puerpera, but always comes from the outside! Even clots or placental fragments in the uterus are harmless, provided they are aseptic, and no mischief-making microbes gain access. Sound reasoning forbids us to multiply causes when we can explain effects by one cause. But just as Dr. Galabin seems ready to plant himself upon this simple truth, he wanders off into the wilderness "of certain zymotic diseases," as probably playing a part in puerperal fever, and further states that septicæmia in the human being is supposed to have several distinct forms, each having a special microbe. It is, however, impossible for us to present Dr. Galabin's views at greater length. His lecture is a storehouse of valuable information, though we are not always impressed with the correctness and the cogency of his reasoning, and the consistency of his opinions.

Ahlfeld<sup>2</sup> is the author of a paper upon *selbstinfektion*. He states that in recent years the term has had various meanings attached to it, some, for example, believing that it implied a process in which the infection originated from the living tissues of the woman, independently of any micro-organism appertaining to the surface and to the surroundings of the body. He adds that he knows of no works in our literature upon the subject in which the authors really express this opinion. Yet, what becomes, we remark in passing, of Dr. Barnes' autosepsis and endosepsis? Nay, is not the whole doctrine of autogenous puerperal fever swept away if we receive Leopold's<sup>3</sup> denial of this definition? Leopold further states that, with Semmelweis, we mean by self-infection those cases in which the poisoning material was already on or within the birth-parts of the woman, within the limits of the affected organism during labor, or were formed during labor and the puerperal state, and in consequence of manipulations

of the physician or of the midwife, or even independently of these, were enabled to enter the body of the woman. "It is not possible to draw a sharp line between *ausserinfektion* and *selbstinfektion*, for the *materia peccans* may consist in micro-organisms found in the pubic hair, or may be present in an insufficiently disinfected bed-cover. If such material has been the cause of infection, there being no fault of the physician and midwife, it is not right to hold these parties responsible for the origin of the puerperal fever." Thus the territory occupied by those who believe in autogenesis "grows small by degrees and beautifully less." The time is soon coming when it will be a dead faith, only preserved from perishing in dust and ashes or embalmed in history.

*The Prophylaxis and Treatment of Puerperal Septicæmia.*—Leopold<sup>3</sup> gives the methods which he has employed at Dresden, and states the great success resulting. From the first of May, 1886, to the first of May, 1887, there were 1403 women delivered without a single death from infection attributable to the clinic. The parturient is carefully washed, and if possible a bath given. The vagina is thoroughly washed out with a solution of corrosive sublimate, 1 to 4000. But the most important part of the prophylaxis relates to those making examinations. The hands, finger nails and forearms are carefully washed for five minutes in warm water, soap and brush, but no antiseptic being used. Then these parts are washed in a 1 to 2000 corrosive sublimate solution, soap and brush being employed. Finally, the hands are immersed in a solution of corrosive sublimate, 1 to 1000. Without occupying space with the statistics of operations performed,—which as is well known, especially if difficult or protracted, create a liability to septic infection,—and the protection obtained by antiseptics, the conclusion of Leopold's paper is given. In it he states that it must be made possible for all women, during labor and their lying-in, to be protected from death by infection, and clinical institutes must regard as their highest aim that infectious diseases, such as parametritis, etc., during the puerperium shall not occur, but be placed in the list of historic maladies. In this connection the remark made by Koch, and quoted by Dr. Senn in his very interesting letters from Europe,<sup>4</sup> to the effect that in consequence of the general use of antiseptics in Germany, there was no opportunity for studying septicæmia,—that the disease in

fact was banished. Playfair,<sup>5</sup> at the last meeting of the British Medical Association, presented a brief paper introductory to a discussion on the prevention of puerperal fever. In its conclusion he gave a series of "antiseptic rules for monthly nurses," and also rules in regard to the use of antiseptics during labor, one of the latter being that when the head is distending the perineum, the external genitals should be sponged with an antiseptic lotion,—a practice which we imagine not one in a hundred of devout believers in antiseptic obstetrics ever follows. Dr. Byers,<sup>6</sup> of Belfast, presents an excellent article upon the prevention of puerperal fever in private practice.

In the local treatment of puerperal septicaemia, antiseptic intra-uterine injections still hold their deserved pre-eminence. Bokelmann<sup>9</sup> considers them indicated (1) when, forty-eight hours after birth, the temperature rises to 101.5° F. or 102.2° F., with frequent pulse, without a recognizable cause for it; (2) when fragments of placenta or membranes remain in the uterus as a cause for disturbance; (3) when symptoms of infection of the endometrium are present.

Runge<sup>8</sup> refers to his having brought before the German Gynaecological Society in Munich, June, 1886, the treatment of puerperal septicaemia by large doses of alcohol, lukewarm baths, and good nourishment, antipyretics being discarded. So far as renunciation of antipyretics was concerned, the members of the Society agreed with him, and also gave their approval of the alcohol treatment, but did not commend the baths, thinking them of doubtful value and often dangerous. Founding his conclusion upon new observations, he now reiterates his faith in these baths as one of the most important parts of the treatment. He believes they improve the nutrition by an influence upon appetite and digestion. Moreover they have a favorable influence upon the sensorium, and upon the circulation and respiration. Dr. Baldy, of Philadelphia, in a paper upon the relation of pyosalpinx to puerperal fever, reports a case of the former in which, one month after labor, he opened the abdomen and removed the right tube distended with pus, and the ovary. The patient, though in an exceedingly critical condition when the operation was done, rapidly recovered. Upon this question the following note from Dr. Fancourt Barnes as to Mr. Tait's views is of interest:—



"Perhaps one of the most important advances in obstetric surgery has been made by Mr. Lawson Tait, who has for some time past been advocating abdominal incisions and washing out the peritoneum in many cases of puerperal fever, believing that many lives which are now lost might thus be saved. His plan is to make an abdominal incision, clear out any foul fluids, leave in a drainage-tube, and close the womb. In some instances he washes out the peritoneum. These cases are full of interest to both surgeon and physician, opening up as they do to the surgeon a new field for abdominal section. While the physician will probably in time discard the word puerperal fever, or have the satisfaction of seeing his patients recover where before death was inevitable, now that the pathology of these cases is more clearly understood, and the aid of a surgeon brought in."

Puncture of the abdomen in cases of flatulent distension in puerperal septicæmia is the subject of several communications by Priestley, Barnes and others,<sup>10</sup> all commending the operation when this distension is very great. But not one of the writers refers to the fact that the operation was first suggested by the great French surgeon, Paré, and that it was done many years ago by one of the greatest of French obstetricians,—the late Depaul.

Dr. Samuel Sloan<sup>11</sup> reports a case of hemiplegia during the puerperium, recovery taking place under the use of cardiac tonics and alkalis. Subsequently other cases of like character are reported in the same journal.

#### PUERPERAL ERYSIPELAS.

Puerperal erysipelas has been very carefully studied by Professor Winckel,<sup>7</sup> from whose observations and conclusions we present the following clinical points: (1) The most frequent points of origin in five-sevenths of all cases of puerperal erysipelas are the genitals and nates: Hugenberger, 13 out of 15; Gusserow, 7 in 14; Winckel, 30 in 42. (2) Primiparæ are affected three to four times more frequently than multiparæ. (3) Puerperæ with vulvar wounds are specially predisposed. (4) Severe operative cases are more frequently affected than others. (5) The children of erysipelatous puerperæ remain free from erysipelas. (6) The greater the number of severe puerperal fever cases, the greater the number of erysipelatous ones.

## PUERPERAL ECLAMPSIA.

The London *Lancet* thus refers to Dr. King's<sup>12</sup> explanation of the cause of puerperal eclampsia: "Dr. A. F. A. King enunciates the theory that pressure on the aorta and vena cava inferior, which he believes to be the cause of the renal troubles in pregnancy and labor, is due to the abnormal position of the fœtus in the latter part of pregnancy. This he believes to be normally the dorso-anterior position of an oblique presentation, *i.e.*, the head normally lies not in the brim of the pelvis, but in the iliac fossa. In this position the shape of the fœtus is such as to avoid pressure on the great vessels. He does not believe that in primiparæ the head of the child is normally lower at the end of pregnancy than in multiparæ, and attributes its frequent low position to vanity, leading to tight lacing. This pressure on the great vessels leads to pressure in the renal and cerebral arteries, thus accounting for the renal troubles as well as the nervous condition. The paper, which is the result of much thought, fails to convince us, and will probably fail to convince others." The judgment of the *Lancet* will meet with very general acceptance.

Our Corresponding Editor, Dr. A. A. Browne, of Montreal, reports a very thoughtful paper upon this subject presented to the Medico-Chirurgical Society of Montreal by Dr. Laphorn Smith. In this paper the author makes the following statements as to the relation of albuminuria, uræmia, puerperal convulsions, and puerperal mania:—

"A moderate amount of renal congestion causes albumin to appear in the urine. A greater amount causes increase of albumin, diminution of urea, and the urea retained in the blood affects nerve-centres, causes headache, disordered vision, etc. A still greater amount of albumin in the urine and of urea in the blood poisons and at the same time starves nerve-centres, and causes dropsy of the brain to such an extent that irritation is set up and convulsions ensue. If this condition continues for some time the nerve cells are seriously altered in nature, so that even when the cause is removed they cannot recover their normal functional activity unless with difficulty, possibly not at all. The guiding principle in treatment, according to Dr. Smith, is, that without grave reasons for the contrary, we should induce premature

labor at any time after the seventh month, at which time we find the urine of the pregnant woman loaded with albumin or considerably deficient in urea."

It may be answered that it has not yet been demonstrated that urea in the blood causes eclampsia, and that there is usually this remarkable difference between the effects of retention of urea in certain other diseases and the latter, in that the temperature rises in eclampsia, and falls in uræmic poisoning. Further, only a minority of pregnant albuminuric women have eclampsia. Finally, an increasing number of cases of eclampsia is known in which there was no proof of renal disease before the eclamptic seizures.

The subject was discussed by the Glasgow Obstetrical and Gynecological Society in connection with a paper by Dr. Malcolm Black.<sup>13</sup> The author attributed the disease to toxæmia, but thought nervous erethism, mental distress, and relaxed abdominal walls predisposed. He also thought the fœtus was an irritant, and therefore advocated speedy delivery in the treatment. Cameron had not much faith in venesection, but he leaned upon chloroform. Reid advocated speedy delivery, preferring manual dilatation of the os, and thought amyl nitrite might be useful in cases occurring some time after labor. This speaker seems not to have remembered that the trials made with this drug do not justify its use, and that it was first suggested some years ago by Dr. Weir Mitchell. Dr. Chambrelent<sup>14</sup> reports a case of grave eclampsia at the eighth month of pregnancy. He brought on labor, a dead child was born, but the mother recovered. Leonard<sup>15</sup> reports a case of eclampsia at the seventh month of pregnancy, occurring in the practice of Maygrier, Hôpital Tenon. The convulsions were controlled by chloroform and chloral, the patient put on milk diet, and the pregnancy ended at term with the birth of a living child. Dr. Pope<sup>16</sup> narrates two cases of eclampsia occurring during labor, which were successfully treated by chloral and potassic bromide; the women were delivered of living children, but one of these died in twenty-four hours. He attributes the beneficial results from the medicines to diaphoresis. One of the patients had 480 grains of the bromide and 120 of chloral, given in 8 doses.

Bompiani<sup>17</sup> reports two cases of eclampsia occurring in pregnant women, who also had albuminuria, treated by inhalation

of oxygen. One of the patients had been treated unsuccessfully with potassic bromide, chloral, bleeding, and subcutaneously injected morphia. Coma and asphyxia were present. When oxygen was used, there was slight improvement; but she soon died. The second patient was cured.

*Veratrum viride* is strongly recommended by several physicians. Dr. McCord<sup>18</sup> reports a patient, seven months pregnant when attacked with eclampsia, to whom he gave potassic bromide, chloral, and morphia, also used chloroform, and bled; he then used hypodermically 12 drops of Norwood's tincture and 10 grains of chloral, repeating the dose in forty minutes; patient had no more attacks, and was delivered of a dead fœtus. Dr. Oatman,<sup>19</sup> in a paper read before the Section on Obstetrics, Ninth International Congress, advocates *veratrum viride*. "After controlling the convulsions by chloroform, morphia, chloral and the bromides, and the evacuation of the uterine contents at the earliest possible period, I exhibit 8 drops of the saturated tincture by the mouth, or 15 drops by the rectum, the dose to be repeated every fifteen or twenty minutes until the frequency of the pulse is reduced to forty beats per minute." Rushmore,<sup>20</sup> in a paper read before the King's County, N. Y., Medical Society, also advocates this remedy, and in his paper gives the statistics of 56 cases of eclampsia occurring ante- and 20 post-partum. Of the former 43 recovered, and 13 died, while of the post-partum cases 22 recovered, and 7 died. The mortality, therefore, was from a little over 30 to a trifle less than 30 per cent. under the *veratrum* treatment. Jewett, in remarks made after the paper was read, stated that the medicine must be given so that the pulse was brought under sixty, thirty minutes being the time within which this fall should occur, or else the medicine is to be repeated. He further stated that in every case in which he had used the *veratrum* before the eighth or tenth convulsion, the patient recovered. Osborn<sup>21</sup> reports a post-partum case of eclampsia successfully treated with hypodermic injection of *veratrum viride*.

On the other hand, Dr. W. Ellison<sup>22</sup> reports a case of eclampsia occurring after delivery, which was first treated unsuccessfully by heroic doses of *veratrum viride*, and then by chloral: the chloral was given by himself, the *veratrum* by a physician visiting her before him. He also states that, finding the bladder greatly

distended, he introduced a catheter and drew off more than a gallon of urine: the patient recovered. Some of the symptoms mentioned seem to us to indicate a very decidedly hysterical element in the disorder, and besides, such abundant secretion of urine is not the rule in true eclampsia. The case reminds us very greatly of one recorded by La Motte in which he attributed the convulsions solely to retention of urine, and which were cured by artificial evacuation of the bladder. Bleeding in eclampsia is strongly upheld by some. Thus Drs. Lovejoy and Allen,<sup>23</sup> in 15 cases thus treated, did not lose a patient. Dr. Ritter<sup>24</sup> advocates giving to albuminuric women threatened with eclampsia 3 to 5 grains of benzo-salicylate of lithia in conjunction with fresh hydragria, 30 grains every four hours. He has the bowels moved two or three times a day with confection of senna. Dujardin-Beaumetz<sup>25</sup> gives 8 to 10 grams of chloral daily, in the treatment of eclampsia. He prefers to give it by the stomach, one gram every hour until the effect is produced, and regards it as the most valuable of all remedies in this disease.

Dr. Eggleston<sup>26</sup> speaks favorably of the morphia treatment. He also uses chloral with it. He states that he has not had a case of eclampsia in his own practice for five years, and he attributes the fact to his directing patients to use bitartrate of potash as soon as there is the slightest swelling of the feet or legs,—two teaspoonfuls in water every morning. He makes this remarkable statement: "In an experience of thirty-six years, thirty cases with thirty recoveries, I have found nothing equal to morphia and chloral." Professor Pajot<sup>28</sup> takes very positive ground against the induction of labor in case eclampsia occurs during pregnancy.

Dr. Strizover<sup>29</sup> reports four cases of eclampsia treated and cured by the hypodermic injection of pilocarpine, in the dose of one third of a grain. In two severe cases the injections were repeated three times. The author comes to the conclusion that pilocarpine proves a useful remedy for eclampsia. He asserts that a weak action of the heart, as manifested by a thread-like pulse, does not contra-indicate a repeated use of the drug upon the recurrence of the fits. He also states that the persistence of an anomalous state of the pupils, dilatation or contraction, must be considered as a sign of a still active process, and justify the expectation of recurrence of convulsions. Dr. Squance<sup>30</sup> reports a

case of post-partum eclampsia successfully treated by pilocarpine employed hypodermically. Lvoff<sup>31</sup> had a patient attacked with eclampsia at the beginning of labor. She was delivered by forceps, but the convulsions continued, though chloroform and chloral, and then inhalations of oxygen were used. She was cured by hypodermic injections of pilocarpine. Dr. Bertrand<sup>27</sup> narrates two cases of albuminuric eclampsia also treated successfully by pilocarpine. Dr. Pfannenstiel<sup>32</sup> reports a fatal case of eclampsia in which death occurred from apoplexy.

#### SCARLET FEVER IN THE PUERPERIUM.

Our Corresponding Editor, Dr. Levison of Copenhagen, Denmark, gives the following observations from Dr. M. Meyer in regard to an epidemic of scarlatina in the Copenhagen Maternity. The epidemic lasted a year, and attacked five *élèves sages-femmes*, sixteen lying-in women, and four women who had been delivered more than thirty days. Meyer did not find a single case in which <sup>§</sup> scarlatina caused puerperal fever, but the symptoms were modified by the puerperal state. The period of incubation was for the most part short,—two to four days. The cutaneous eruption was pale and not pronounced, and also the affection of the pharynx. In five patients there was seen a miliary eruption, but this had no significance in regard to the prognosis. In seven cases there were renal complications, and in ten rheumatic affections. The lochial flow was not influenced by the scarlatina, but the secretion of milk was in all cases insufficient. Of the genital organs in six *accouchées* suffering with scarlatina, in one there was a hæmorrhage; eight presented excoriations covered with false membranes in the vestibule; one of them seemed to have a septic, at the same time as the scarlatinal infection, for she suffered from perimetritis, endometritis, and finally peritonitis; and another attacked by scarlatina two days before she was delivered, remained up to the twelfth day before a parametritis was manifested, and subsequently a mortal peritonitis. The other women attacked with scarlet fever and puerperal maladies, did not present any indications of puerperal disease until ten to fifteen days after delivery. The diagnosis of scarlatina presented difficulties only in those cases complicated by simultaneous septic infection. Meyer does not look upon scarlatina in the puerperium as offering the grave

prognosis given by Braxton Hicks and others, and does not think that scarlatina causes a greater disposition to puerperal affections. The treatment ought to have for its end the avoidance of all occasion for septic infection. The patient should be left as quietly as possible, without touching, using antiseptic lotions to the vestibule and the vagina only with the greatest precautions. Of the infants of scarlatinal mothers, two were stillborn, the condition of two was unknown, two were taken away from the mother before scarlatinal symptoms appeared in her, and seventeen remained with their sick mothers. Of these seventeen one died of erysipelas, one of a disease which was perhaps scarlatina, while all the others remained well. Dr. Palmer<sup>23</sup> reports a case of scarlet fever and diphtheria in the puerperal state. The history presents some striking contrasts to the observations just recorded. On the twelfth day after confinement, the patient had high temperature, and "a diffused redness, at first erysipelatous in appearance, subsequently scarlatinous, commencing at the vulvar margin, gradually extended forward over the abdomen nearly to the umbilicus, backward over the buttocks, the back, above the waist, shading off in intensity of color, from the focus of invasion to limits mentioned; a faint scarlatinous eruption was observed over the remaining body; the pharynx was red." A few days after the infant began to show an imperfect erythematous eruption; the nurse had great redness and congestion of the pharynx, and the husband had a severe attack of pharyngeal diphtheria. Dr. Palmer details the diphtheritic manifestations in the puerpera, and the treatment pursued, happily resulting in her recovery. It would be interesting to know when, if at all, albumin appeared in the urine of Dr. Palmer's patient, and how the anomalous course of the eruption can be explained; for that eruption had at first the appearance of erysipelas, and its place of manifestation at first was quite characteristic of this disease, and not of scarlatina.

#### PUERPERAL TETANUS

Dr. C. V. Boarman<sup>34</sup> reports a case of puerperal tetanus coming on seven days after delivery, and proving fatal in two days. The woman had been first attended in her labor by a midwife, who in the course of a few hours had given her half an ounce of the fluid extract of ergot. Dr. Boarman was called,

and upon his arrival found the uterus in a state of tetanic contraction, the shoulder presenting and the arm prolapsed. The uterus was so strongly and constantly contracted that it was impossible even so much as to introduce his finger. Version being impossible, therefore, though full anaesthesia by ether was employed, the continued contraction did not yield, and the child being dead, embryotomy was performed. The second day after delivery "well-marked puerperal fever" occurred, "running its course in a few days," and after the subsidence of this, the fatal tetanus. It may be questioned whether the condition of the uterus found by the doctor when first called, was to be attributed exclusively to the ergot given, for such condition may occur in a shoulder presentation independently of this drug. Nothing is said of any local treatment being used for the "puerperal fever," though the conditions of the woman—the protracted labor, the dead child, and its difficult removal by embryotomy—would be very favorable for septic infection. This septic infection occurring first manifests itself in so-called puerperal fever, and next, most probably, in tetanus; that is to say, puerperal tetanus arises from septic infection. As if in confirmation of the septic origin of puerperal tetanus, we have the report of a case of the disease<sup>35</sup> coming on the seventh day after delivery and ending in death on the tenth. The post-mortem examination "revealed puerperal sepsis originating in a piece of retained placenta. It was concluded that both the sepsis and the poison of tetanus were introduced into the system through the placental site."

Still further to confirm the view that puerperal tetanus is a septic disease, and that, usually at least, the ordinary manifestations of puerperal septicaemia precede it, we have a fatal case of the disease reported by our correspondent, Dr. Mary Pauline Root, of Madura, Southern India. The poor victim had been delivered by a native midwife, and one of the labia had been torn its entire length. Such an injury, especially when local antiseptic means were not carefully employed, would be very liable to be followed by septic infection.

While the number of cases of puerperal tetanus is small, the unreported cases may be quite large, and the possibility of its occurrence, its obvious septic character and its almost invariably fatal end, enforce the argument in favor of using antiseptics.



PUERPERAL NEURITIS.

Möbius<sup>36</sup> states that the terminations of the median and of the ulnars, both in the sensory and motor fibres, may become affected after child-bed, especially after puerperal diseases. The right hand is more frequently affected, but in some cases both are concerned. In some cases there is paralysis. Prognosis is usually favorable. Möbius gives 7 cases of puerperal neuritis. The first is that of a woman 44 years old, who had her last labor 6 years before. There was atrophy of the parts supplied by the median involving each hand; paraesthesia of the thumb and of the ring finger, and sensibility to pressure of both medians above the wrist. In this case there was no benefit from electric treatment. Another patient, 32 years old, had numbness of the right hand, following her confinement 6 months before. There was anaesthesia of the parts of the right hand supplied by the ulnar nerve, and slight paresis of the muscles of the forearm and hand dependent upon the same nerve. Another woman delivered 11 weeks before, had for 10 weeks severe pain in the right shoulder, and it was impossible for her to raise her arm. There were paralysis, with atrophy and degenerative changes of the deltoid, supra- and infra-spinatus, paresis of the triceps, and anaesthesia in the region of the axillary nerve.

PUERPERAL CYSTITIS.

Lavaux<sup>37</sup> advises in the cystitis occurring in the puerperal state, if the inflammation be mild, washing out the bladder with a warm saturated solution of boric acid; if the determining cause be gonorrhoeal urethritis, still use the boric acid wash, but also a solution of nitrate of silver, 1 to 500, or even 1 to 250; if the cystitis is very painful after the boric acid, inject a solution of muriate of cocaine, 1 to 50, or even 1 to 25.

PHLEGMASIA ALBA DOLENS, WITH EXTENSION OF INFLAMMATION TO ARTERIES.

A woman delivered on the 20th of November entered the hospital on the 2d of December, in consequence of phlegmasia dolens of the left lower limb. On the 12th of January she died, and at the autopsy there were found coagula in the utero-ovarian veins, the renal, the vena cava, the hypogastric and the femoral, and also

in the renal arteries, the aorta, the iliac and the femoral. The propagation of the inflammation from the venous to the arterial system might have occurred through the medium of the capillary system of the kidney, or by the simple contact of the accompanying arteries with the inflamed veins.<sup>38</sup>

#### UTERINE INVOLUTION ASCERTAINED BY THE SOUND.

Dr. Sinclair, of Boston, was the first to employ the uterine sound, and by its measurements determine the decrease of the uterus in the puerperium. Charpentier, not then knowing that he had been preceded by Sinclair, employed the same means; he was followed by Milsom, who also was ignorant of what had been done in this method previously. And now Hansen<sup>39</sup> has been working in the same way, only his examinations have been made for a longer period than those of Sinclair, Charpentier, or Milsom, and the results which he has obtained are more valuable. Hansen made his first examination on the tenth day after delivery, then on the fifteenth; the next interval was one week, and in the third month, two weeks, the last examination being made at the end of the month. The entire number of women examined was 200, and 1048 sound measurements were made. In women whose puerperium was normal, he found a regularly progressing diminution in the size of the uterus from the tenth day to the tenth week; the cases thus referred to were 120 women from 18 to 34 years of age, who nursed their infants. The duration of involution was in general 10 weeks; the shortest period observed was four weeks, and this in only one case, while the longest period was three months, which was observed in four women. The author found that involution was slower in women who did not nurse. This fact, of which the antecedent probability is so great, though some prominent obstetricians have either doubted or disputed it, furnishes a strong argument in favor of maternal nursing. After premature labor the lessening of the uterus is somewhat slower than after mature; the same was the fact after the birth of twins, and after labors attended with or followed by hæmorrhage.

His examinations gave him no case of superinvolution; hence the natural conclusion is that this must be a rare affection. In only one case did any injurious consequences result from the use of the sound. Parametritis occurred in one woman in the eleventh

week. The author also used his material to ascertain the form and position of the uterus in normal lying-in. The tenth day he found the uterus anteflexed in 95 per cent.; in 54 per cent. this was right-angled; distinct anteversion was present in only one case, and there was no instance of retrodeviation. At the fifteenth day there were 85 per cent. of anteflexions, the flexion being very decided in 31.4 per cent. The uterus was horizontal in 11 per cent., that is, the fundus could be plainly or only indistinctly felt through the vaginal vault, and there was retrodeviation in 3.4. Six weeks after birth there were 46.6 per cent. of anteflexions, 5.5 retrodeviations and in 50.9 per cent. the uterus was straight. Distinct anteversion is rarely found in the entire involution period.

One of the most important practical lessons to be learned from the investigations of Hansen is that obstetricians should insist upon a longer rest for the puerperal woman. When we remember that many a woman is up and at work two or three weeks after childbirth, and that even those whose circumstances in life do not require labor, are frequently participating in social pleasures and fatigues at the end of six weeks and two months, we can easily understand why disorders of the genital organs not infrequently result. The following table of measurements of the uterus in 120 healthy nursing women is given, the measurements amounting to 636: Tenth day, 10.6 cm.; fifteenth day, 9.9.; after the third week, 8.8; after the fourth week, 8.0; after the fifth, 7.5; after the sixth week, 7.1; after the seventh, 6.9; after eight weeks, 6.7; after ten weeks, 6.5; after twelve, 6.5.

#### REFERENCES.

1. Brit. Med. Jour. 2. Cent. f. Gyn. 3. Deut. Med. Woch. 4. Jour. Am. Med. Assoc. 5. Brit. Med. Jour. 6. Brit. Med. Jour. 7. Am. Jour. Med. Sci. 8. Arch. f. Gyn. 9. Berlin klin. Woch. 10. Lancet. 11. Lancet. 12. Am. Jour. Obst. 13. Glasgow Med. Jour. 14. Jour. de Méd. de Bordeaux. 15. La France Méd. 16. Am. Pract. and News. 17. La Semaine Méd. 18. Daniel's Texas Med. Jour. 19. Med. Register. 20. Gaillard's Med. Jour. 21. Trans. Texas State Med. Assoc. 22. Med. Register. 23. Boston. M. and S. Jour. 24. North Carolina Med. Jour. 25. Chicago Med. Jour. and Exam. 26. Jour. Am. Med. Assoc. 27. La Normandie Méd. 28. l'Union Méd. du Canada. 29. London Med. Rec. 30. Lancet. 31. Jour. de Méd. de Paris. 32. Cent. f. Gyn. 33. Cinn. Lancet-Clinic. 34. Jour. Am. Med. Assoc. 35. German Corr. Med. Press and Circular. 36. Münch. Med. Woch. 37. Jour. de Méd. de Paris. 38. Ann. de Gyn. 39. Zeit. f. Geburt. u. Gyn.

[Undated references apply to journals published in 1887, and original articles can be found by consulting the indexes of the respective publications.]

## DIETETICS OF INFANCY AND CHILDHOOD.

By LOUIS STARR, M.D.,

PHILADELPHIA.

---

THE choice of food and the method of feeding bear so close a relation to age that it is necessary in studying these questions to regard them from the standpoint of the two stages of a child's life, namely, *infancy*, or the period extending from birth to the age of two-and-a-half years, and *childhood*, the interval elapsing between the complete eruption of the milk teeth and the establishment of puberty.

### INFANCY.

An infant may be fed in one of three ways: 1st, from the mother's breast; 2d, from the breast of a foster mother or wet-nurse; and 3d, from a bottle, by the method known as artificial or hand-feeding.

1st. Feeding from the maternal breast. There can be no doubt that this, being the natural, is at the same time the proper method of nourishing the human infant; and fortunate is the babe that, in our day of advanced civilization and city-living, can draw from the breast of a robust mother an abundant supply of pure, health-giving, tissue-building food.

It follows, therefore, that every woman who is free from certain contra-indicating diseases, to be mentioned later, should nourish her child solely from her breasts up to the age of eight months and partially to the end of the first year, or, failing in either limit, so long as possible.

The infant should be put to the breast as soon as the mother has recovered somewhat from the fatigue of labor,—some four or eight hours after birth. Of course no milk can be drawn at this early date; but the babe gets a small quantity of thin, watery colostrum which affords sufficient nourishment, and at the same time, from its laxative properties, cleans the bowels of meconium. This procedure, too, is of great advantage to the mother; for it

insures proper uterine contraction, draws out the nipples and encourages the formation of milk.

As the secretion of milk is never fully established until the third day after labor, it stands to reason that no food other than the colostrum is required before that time. Hence, the practice of filling the infant's stomach with gruel, sugar and water, and other sweetened mixtures, is more than useless, for it diminishes the activity of sucking and the consequent stimulation of milk production. Put the child to the breast every two hours while the mother is awake and there need be no fear of starvation.

After the third day, should the breasts not yield a supply of milk, a little sound cow's milk diluted with double its quantity of water and sweetened with sugar of milk, may be given every fourth hour, the babe being put to the breast in the mean while. So soon as the flow begins, however, artificial feeding is to be discontinued.

Usually on the fourth day milk is secreted and regular lactation commences. Many untrained mothers make a failure of nursing because they know nothing of the manner of giving suck; of the length of time the child should be kept at the breast; of the proper time for, and interval between, feeding, and of the importance of regularity. Upon these points the physician must be able, if required, to give minute instructions.

When giving the breast the infant must be held partly on its side, on the right or left arm according to the gland about to be drawn, while the mother must bend her body forward so that the nipple may fall easily into the child's mouth, and steady the breast with the index and middle finger of the disengaged hand, placed above and below the nipple. In case the milk run too freely—a condition very apt to excite vomiting—the flow is easily regulated by gentle pressure with the supporting fingers. Each of the breasts should be drawn alternately, the contents of one being sufficient for a meal; and a healthy child may be allowed to nurse until satisfied, when he will stop of his own accord, drop the nipple and fall asleep with milk still flowing over his lips.

During the first six weeks the breast is required every second hour from 5 A.M. until 11 P.M. Then the infant should be put in a crib by the mother's bed or, better still, in the nurse's room, and there remain quietly until the morning feeding. This secures the mother six hours of uninterrupted repose,—a matter of great impor-

tance to her general health and consequent capacity for prolonged lactation. As to the infant, he may rebel at first, and wake and cry, so that it is necessary to quiet him with a little milk and water administered from a bottle; but often after a few days, and certainly at the end of a week or two, the good custom of sleeping at night is formed, and there is no further trouble.

Regularity in meal hours is even of more importance in early than in adult life, on account of the natural feebleness of digestion. To secure this it is only necessary to have a little perseverance; for infants are such creatures of habit that a short training brings them into the way of expecting food only at certain times, and when healthy they wake to suck the breast with almost the precision of the clock. While insisting upon this rule, one must recognize the fact that, although in the vast majority of instances a two-hours' interval is most suitable up to the second month, there is no absolute law as to the number of daily nursings. Some infants seem to need food less frequently, and it is best to respect their peculiarity and not force the breast upon them so long as they sleep well, do not fret when awake, and thrive generally. Others again may require it oftener,—every hour and a half, perhaps, and even once or twice at night. In these exceptional cases an appropriate schedule can only be made by close observation of individual characteristics.

A common and most ruinous mistake is to resort to constant feeding as a means of pacifying crying. Babies certainly do cry from hunger; but just as frequently the crying results from colic or from the discomfort and pain of indigestion. Every mother should be able to recognize the difference. The cry from hunger usually begins after a sound sleep, is not peevish, and stops at the sight of the breast, when the infant rouses himself, presents an expression of pleasure, clinches his hands and flexes his limbs. The cry of colic is violent and paroxysmal; the face is livid and wears an expression of suffering; the abdomen is distended and hard; the hands and feet are cold; the legs are drawn up or kicked violently about; and an explosion of wind from the mouth or anus ends the attack. A peevish cry, hot skin, and sour breath attend indigestion.

It stands without saying that the cry of hunger must be relieved by giving food; but this is the very worst thing to do under other circumstances, for it both breaks up good habits and produces

serious mischief. The pain of colic and the discomfort of indigestion are chiefly due to the accumulation of flatus resulting from the fermentation of food. Mothers soon learn, and unfortunately infants too, that the breast-milk temporarily relieves suffering. This it does in the same way as any other warm liquid; but, unlike a simple fluid, milk only adds more material to the already fermenting contents of the gastro-intestinal canal, and every nursing is soon followed by more pain, until between crying and sucking and sucking and crying the infant's life is passed in misery, if not cut short altogether. Instead of continuous feeding, the plan for relief is to decrease the quantity of food by increasing the intervals between nursing, and by abridging the time of lying at the breast, while therapeutic measures are employed to strike at the root of the evil.

After the sixth week, the interval between nursings may be slowly increased until by the fourth month, it reaches three hours. During this period also the time of lying at the breast may be gradually lengthened; for the quantity of milk secreted and the child's appetite and capacity for food are all augmented as the days pass by. At the end of the sixth month, feeding every fourth hour suits some children well; but as a rule the three-hour interval must be adhered to from the fourth month to the end of lactation.

Many authorities recommend additional artificial feeding, alternating with nursing, after the sixth or eighth month. Such a plan is perfectly proper if the babe cease to gain strength and flesh while on the breast. If otherwise, the maxim of not interfering with any course that is doing well is as applicable here as elsewhere, and the breast may be relied upon entirely until the time comes for weaning.

Should additional nutriment be required, the food must be selected with due reference to age and prepared in the same manner as in regular hand feeding.

The date of weaning cannot be exactly fixed for all cases, since it must depend upon two conditions,—the health of the mother and the development of the child. When the former continues to be robust, and the child steadily grows and gains flesh, lactation can be prolonged until the tenth or twelfth month. If persevered in longer the mother's strength begins to fail, her milk is lessened in quantity or becomes poor in quality, the child's

nutrition suffers, and he grows pale, thin and flabby and may develop rickets.

Change in the manner of feeding may be accomplished gradually or suddenly. In gradual weaning about four weeks are required to prepare for the absolute withdrawal of the breast. For instance, if suck be given every three hours, from 5 A.M. until 11 P.M., or seven times a day, there should be during the first week of preparation one artificial feeding and six nursings daily; during the second, two and five; during the third, four and three; during the fourth, six and one. Then the breast must be entirely withheld. Carefully prepared milk-food, administered from a bottle, is the best substitute. At the age of ten months a mixture that ordinarily agrees well is:—

|    |                |   |   |   |   |   |   |   |       |
|----|----------------|---|---|---|---|---|---|---|-------|
| R. | Cream,         | . | . | . | . | . | . | . | ℥ss.  |
|    | Milk,          | . | . | . | . | . | . | . | ℥iv.  |
|    | Sugar of Milk, | . | . | . | . | . | . | . | 3j.   |
|    | Water,         | . | . | . | . | . | . | . | ℥jss. |

This is to be poured into a perfectly clean bottle, warmed in a water bath, and taken through a clean, plain rubber tip. Should the quantity (six fluidounces) be insufficient to satisfy the child's appetite, all the ingredients except the cream may be increased until the mixture measures eight or even twelve fluidounces, according to the demand.

When such accidents as fever, disordered digestion, with vomiting and diarrhœa, or the actual cutting of one or more teeth occur during the period of preparation, the number of artificial feedings must be reduced, or the breast resumed until the disturbance be passed; then the course may be begun again and carried to its completion.

Usually there is little trouble in weaning infants in this way. Sometimes they become fretful under the change and may refuse food entirely for a day or more; but a little determination on the part of the mother and the cravings of hunger will soon overcome this difficulty.

Sudden weaning is not advisable unless while the breast is being presented at times there is an absolute refusal to take artificial food from either a bottle or a spoon. This is most apt to occur when food has been given too frequently, and when the breast has been used as a means to quiet crying. The plan is also to be recommended when the mother's health becomes so affected



as to render any further sucking a positive peril to the child's life; rapidly developing pulmonary tuberculosis and attacks of erysipelas or of variola are instances in point.

The physician is often forced to decide upon the advisability of premature weaning. His decision must be made cautiously and after thorough investigation of two propositions, namely,—*a*, the effect of further lactation upon the health of the mother, and *b*, the requirements of the child.

*a*. Lactation being a physiological process is not a drain upon the systemic strength so long as the functions of nutrition are actively performed; but under other circumstances it very frequently becomes so. Consequently, premature weaning is necessary when the mother is attacked by any acute disease threatening dangerous temporary prostration, such as typhoid or typhus fever. A change must also be made if pulmonary tuberculosis is developed, or, being already present, rapidly advances under the drain of milk-secretion. Ordinarily, however, the general condition that leads to withdrawal of the breasts is one of simple loss of strength and flesh on the part of the mother.

Undoubtedly these indications often warrant the procedure; but every one who has seen much of children's practice must have met with many cases in which the advice to wean has been given carelessly and unnecessarily, and in which the child might have had its natural food had proper attention been given to the health of the mother.

If a woman be worn out by household cares, if she wears herself out by a round of dinners, balls or shopping, or if she exposes herself to injurious atmospheric conditions and eats improper food, she grows weak and thin whether she be nursing or not; and a woman heedless of her health will probably care little whether she suckles her child or gives it up to a wet-nurse or to the bottle.

In addition to making nursing the important duty of her life for the time being, a mother must be as free from housekeeping cares as possible. Mental and physical fatigue is to be avoided, sufficient exercise must be taken to maintain a healthy appetite and digestion and abundant time devoted to rest and sleep. Beyond securing a plentiful supply of plain and easily digestible food, with a judicious portion of meat, vegetables, and fruit, it is unnecessary to give special attention to the diet.

Should the secretion of milk be scanty, it may often be increased by the free use of animal broths, chocolate, gruel, or milk, and sometimes the moderate employment of stimulants, in the form of ale and porter, may be necessary. Such tonics as malt extract, ferrated elixir of cinchona, bitter wine of iron, and the preparation known as "beef, wine and iron," are useful, when there is anæmia, or when the general failure of strength cannot be overcome by food and attention to hygienic rules. Galactogogues, too, are advocated by many authorities, though they can scarcely be said to be more than adjuvants. The most efficient remedies of this class are electricity applied to the mammae, and pilocarpine. Aubert and Pierron<sup>1</sup> record a number of cases of suspended lactation in which a copious secretion of milk was produced by faradization of the breasts. One observer used ordinary sponge electrodes moistened; the other a special, spherical copper cap accurately fitted to the breast. The current, which should never be strong enough to cause pain or contraction of the pectoral muscles, may be applied for five minutes daily.

M. Chéron,<sup>2</sup> after careful investigation of the subject, gives a high recommendation to pilocarpine as a milk producer. This author injects subcutaneously five centigrammes (gr.  $\frac{1}{6}$ ) of nitrate of pilocarpine as soon as the milk becomes scanty, whether the change has taken place suddenly or by degrees. The injections are repeated every day. If the lessened secretion has existed for some time; ten or twelve injections are required; but if it has occurred suddenly two or three will suffice. The treatment has no ill effect on either the mother or child. To be successful it is essential to employ a sufficient dose of the agent to produce some heat of the skin of the face and body. The procedure is the same as that advocated by Ringer in 1875.

The ordinary local conditions indicating premature weaning, on the mother's account, are fissures of the nipple and mammary abscess.

Fissure being usually a unilateral condition, it is only necessary to retire the affected side from duty and nourish the child alternately from the unaffected gland and from the bottle until healing takes place, the disabled breast being pumped in the mean time to keep up secretory activity. Should both sides be affected weaning may be imperative, on account of the extreme pain pro-

duced by sucking, though, even under these circumstances, an effort must be made to maintain the flow of milk by regular pumping. Sometimes women are able to struggle through the attack by taking advantage of the relief and protection afforded by a nipple-shield.

Fissures of the nipple are preceded by abrasion, excoriation or erosion having origin in erythema, eczema or ecchymosis, or result from want of cleanliness or from keeping the nipple too moist, as when constant sucking is allowed or when there is galactorrhœa. It may be prevented by proper attention to the nipple before confinement. During the latter months of pregnancy the clothing covering the breast must be loose, and the wearing of a wire tea-strainer over the nipple to prevent pressure has been recommended by one authority. Each day for three months before labor the nipples should be washed thoroughly with hot water in the morning and anointed with cocoa-butter in the evening. At the same time, should the teats be small or retracted, the woman must be taught to use her thumb and finger to draw them out. This process is not only of advantage in giving proper size and shape, but brings the skin into good condition without hardening it. The application of alcoholic and astringent solutions are not to be recommended, as they tend to harden the tissue, which should be soft and pliable rather than tanned and hence liable to crack.

Erythema or eczema of the nipple require the application of ung. zinici oxidi, or ung. hydrarg. ammoniat.

When a fissure exists, it is best first to see whether or not nursing can be continued by means of a nipple-shield. Should the child refuse this, a good plan is to fill the shield with warm milk and invert it over the nipple. The infant then draws the fluid at once and without difficulty, and will often continue sucking so that the breast-milk follows. After nursing and removing the shield, the nipple must be dried thoroughly with absorbent cotton and the following lotion applied with a camel's-hair brush:—

|                  |   |   |   |   |   |   |   |         |
|------------------|---|---|---|---|---|---|---|---------|
| Acid. borac.     | . | . | . | . | . | . | . | gr. xx. |
| Mucilag. acacie, | . | . | . | . | . | . | . | ℥j.     |

Should this fail, the fissure may be touched every other day with a point of nitrate of silver. Other highly recommended applications are tincture of benzoin, carbolic acid (95 per cent, solu-

tion), and ungu. hydrarg. ammoniat. Parvin<sup>3</sup> recommends a 5 per cent. solution of carbolic acid.

Personally, I have procured much relief from pain, and even positive curative results from the application of an 8 per cent. solution of cocaine to the fissure half an hour before nursing. When this is done, the nipple should be well washed with warm water immediately before the breast is presented to the infant. When the fissure is so deep as to bleed freely at each sucking, it is absolutely necessary to withdraw the breast and encourage healing by a suture.

The most frequent cause of inflammation of the breast is undoubtedly fissure of the nipple, whether this gives rise to a septic material that is reabsorbed, or furnishes the nidus of a microbe, which, entering the circulation, produces suppuration. Unquestionably, too, this condition may be caused by the habit, so common with untrained monthly nurses, of feeding the infant during the first three days of life, instead of allowing it to draw the breasts at regular intervals of two hours. Three forms of mastitis are encountered: first, inflammation of the superficial connective tissue of the breast,—supramammary inflammation; second, very rare, inflammation of the connective tissue between the gland and the thorax; third, and most frequent, true mastitis or inflammation of the mammary parenchyma.

Rest for the affected organ is of greatest importance in the treatment. This includes cessation of nursing, and abandonment of the breast pump. A saline cathartic—a tablespoonful of effervescent citrate of magnesium, for example—may be administered, and in case of fever ten grains of sulphate of quinia. Belladonna may be applied locally, either in the form of the officinal unguentum belladonæ or a solution of atropiæ sulph., gr. iv. to ʒj., care being taken to discontinue the applications in case of dilatation of the pupils or dryness of the throat. Iodine ointment and lotions of carbonate of ammonium, ʒj. to Oj., are also recommended. It is, however, most important to thoroughly support the breast and compress it by a bandage.

Poultices, or in other words heat and moisture, are to be avoided until the occurrence of suppuration is indicated by rigors, and the swelling becoming soft and superficial. As soon as fluctuation is felt a free incision should be made—always in the direction

of the ducts and with antiseptic precautions—and free drainage established. Afterwards compression is of great advantage. For this purpose Parvin<sup>3</sup> recommends the following: “Take a large flat sponge that will completely cover the mammary gland, and after it is thoroughly cleaned, put it in a letter-press for a few hours, or otherwise secure its compression; then place it over the breast, which is first covered with a layer of cotton batting and apply a bandage. After the application of the bandage a little water is allowed from time to time to pass through the bandage, moistening the sponge which consequently swells, and thus more and more compresses the gland, bringing the abscess walls in perfect contact.” Opium is always indicated for the relief of pain; the rectum is the best channel of administration, and suppositories probably the best form.

Corson states that the application of ice water reduces inflammation and gives comfort to the patient. He writes, “There is no better way to apply the ice than to put it in a bladder with just enough water to float it, or just to form a water cushion that will fit the inflamed part nicely.” A simple layer of muslin over the gland will make the bladder fit more accurately. When mastitis terminates by resolution it is probable that milk secretion will continue, and that nursing can be resumed. Lactation may also be continued after the formation of a small abscess; but if suppuration be extensive and a large area of the gland be involved, there is little hope for further usefulness.

*b.* On the part of the infant, there are several indications for anticipating the time of withdrawing the mother's breast. Thus, it must be done if the occurrence of pregnancy or the recurrence of menstruation render the milk unwholesome; if the mother contract a dangerous contagious disease, as variola, scarlet fever, or erysipelas; if the mammary glands become inflamed; if the breast does not afford sufficient nourishment and artificial food be refused; and, finally, if dentition be markedly delayed and the premonitory symptoms of rickets appear. As to the amount of nourishment, it must be remembered that the breast milk may be of good quality, but so diminished in quantity that it is insufficient, or, while abundant in quantity, so poor in quality that it does not meet the demands of nutrition. Even without a minute examination of the milk, it is possible to form a good idea of which con-

dition is present from the behavior of the infant in the act of sucking. If the milk be good in quality but deficient in quantity, the babe, when put to the breast, seizes the nipple as if famished and draws upon it vigorously for a moment or two, and then drops it with a scream of rage. On the contrary, should there be an abundant supply of the poor milk, the nipple is grasped languidly, the child lies a long time at the breast and falls asleep there. Consideration of the final indication opens the question of the propriety of regulating weaning by the progress of dentition. This is certainly a good guide, but not in the way implied in the old precept, that the child must not be taken from the breast until evolution of the canine teeth. Insufficient food is one of the chief causes of rickets, and rickets more than any other disease delays dentition; consequently, should the teeth not pierce the gum in time, the inference is for other food rather than a continuance of the faulty maternal supply.

Upon deciding to anticipate the time of weaning, the next point to consider is whether the infant shall be brought up by hand or by a wet-nurse.

2d. The advantage of feeding from the breast of a wet-nurse is that the mother's milk is substituted by the milk of another woman; in other words, that natural feeding is continued,—a matter of moment in all cases and of inestimable importance with delicate children. The disadvantage consists in the difficulty of finding, in a woman belonging to the class from which wet-nurses come, all the moral and physical characters essential to a good substitute, and the fact that a stranger is introduced into the household often to deceive and annoy the family, and on the slightest provocation to leave her charge to fate or to the tender mercies of another of her kind. For these reasons it is preferable, in the majority of instances, to trust to careful bottle-feeding. Nevertheless, as some children must have human milk if their lives are to be saved, the rules for selecting a wet-nurse must be understood.

The woman chosen must be strong and robust, but rather spare than fat. Her bill of health must be perfectly free from hereditary tendency to mental or physical disease and from taint of syphilis, tubercle or scrofula. She must be cheerful, good-natured, active, careful and temperate in habits. Her age should be between twenty and thirty years; she should be a multipara,

that she may understand the care of an infant and the manner of giving suck; her child ought to be nearly the same age as the infant to be adopted, and she must be able to afford an abundant supply of good milk.

The last quality can be estimated by inspecting the breasts, by examining some of the milk drawn by a pump, and by ascertaining the condition of the woman's own child. The breasts of a good nurse are not necessarily large, but are firm to the touch and pyriform in shape, with well-developed, prominent nipples, and with the skin distinctly marbled with large blue veins. The milk, which ought to flow readily on pressure or on suction, should be opaque and dull white in color, have a specific gravity of 1.031, and alkaline reaction, and show, when placed under the microscope, a number of medium-sized, fat globules. Its quantity may be ascertained by weighing the child before and after sucking, the normal gain being from three to six ounces. There is, however, no better or more readily applied test of the quality of a nurse than the size, weight, and general development of her child; and if it be weak and ill-nourished, no amount of fitness in other respects can warrant her engagement.

Even when a woman is found fulfilling in her single person all of the above conditions—a rare event, indeed—it does not necessarily follow that her milk will suit the babe to be suckled. Then changes and new trials are in order until the desired end be attained.

The diet of a wet-nurse and the manner of weaning in case this method of feeding be employed, must be governed by the rules already given for maternal feeding.

Few wet-nurses are employed in Philadelphia, for the simple reason that they are most unsatisfactory. Personally, I have had such good results from carefully regulated bottle-feeding, that I have almost given up the employment of wet-nurses, preferring to regulate the artificial food myself rather than allow an ignorant woman to, *sub rosa*, supplement her deficient supply of breast-milk by an unskillfully proportioned food,—an event of not uncommon occurrence. Physicians in other cities must have a supply of better nurses, for in New York and Boston, for example, a wet-nurse is a common prescription.

3d. In my experience, there are few American women, especi-

ally in the well-to-do classes, who do not look upon the duty of nursing their babies as a pleasant one; but there are many who are completely unable to do so, and a vast number in whom the secretion of milk fails after a few weeks or months of lactation. They must, through no fault of their own, resort to a wet-nurse or to artificial feeding. Usually, in Philadelphia, they select the last method, with results that vary in direct proportion to the care and intelligence displayed in carrying it out.

There can be no doubt, though the statement is a bold one and seemingly contrary to nature, that, taking the average, infants properly brought up by hand are better developed and enjoy more perfect health than those completely breast-fed. Of course there is no artificial food equal to the natural—the sound breast milk of a robust woman; and a child fed upon this must thrive, if other circumstances be favorable. Unfortunately, the woman who has sufficient health and strength to furnish an abundant supply of good milk during the ten or twelve months of normal lactation is unique in our day; and the great bulk of those who do nurse children grow pale, thin and feeble, and give milk which, though sufficient in quantity to fill the suckling's stomach and satisfy the cravings of hunger, does not contain enough pabulum to meet the demands of nutrition. Such mothers always complain that their children are puny, peevish and always ailing, and wonder why their neighbor's babies, fed upon the bottle, are so round, jolly and healthy. The explanation lies in the simple fact that good cow's milk is better than bad breast milk.

Infants can be reared perfectly well upon the bottle, but much more care and trouble is involved than in breast-feeding. The task is comparatively easy to accomplish when the powers of digestion are inherently active, and especially when artificial feeding is not required until after the child has been suckled for several weeks. In these cases the stomach and intestinal canal, inactive in fetal life, are trained to their new duties under normal conditions, and so prepared for the digestion of properly selected artificial aliment. On the contrary, if digestion be naturally feeble, or if the infant must be bottle-fed from the first, great difficulty may be expected, and a most skillful handling is demanded.

To insure success in hand-feeding, it is necessary to remember that an infant is not nourished by the food he simply swallows,



but by that portion of it he digests and assimilates. The best diet, therefore, is one so adapted to age and digestive power that everything eaten will be digested and absorbed. But as children differ as much in constitution as in feature, it is impossible exactly to formulate a food that will be applicable to every case, or one that needs no change from month to month of progressing growth. As age and strength increase, there is a corresponding development of the gastro-intestinal functions and a call for more and stronger food. On the other hand, should the system be accidentally reduced by disease, the digestion, sympathizing in the general debility, temporarily loses its normal activity and assumes that of an earlier age. Now, more nourishment is certainly needed to build up the failing strength; but it is to be supplied by giving such food as can be completely assimilated and not by forcing down strong food merely because it is *strong*; for the latter, when not vomited, passes through the bowels undigested, and the little creature starves to death in the midst of plenty, or dies from the ill effects of the constant presence of fermenting food in the alimentary canal. On these accounts many changes in diet as to quality and quantity must be anticipated and made.

Other important matters to be studied in detail are: *a*, the selection of a proper substitute for the breast-milk; *b*, the quantity to be given; *c*, the method of preparation; *d*, the mode of administration; and *e*, the means of preservation.

*a*. Healthy breast-milk must be taken as the type of infants' food, and the nearer an artificial substance can be made to approach it in chemical composition and physical properties, the more perfect is it.

Normal breast-milk has a specific gravity of 1.031. It is a persistently alkaline fluid, having a somewhat animal, usually disagreeable, and very rarely sweetish taste. It is bluish white in color, and thin and watery in consistence.

According to Leed's very thorough analysis it contains:—

|                                 |                  |
|---------------------------------|------------------|
| Water, . . . . .                | 86.766 per cent. |
| Total solids, . . . . .         | 13.234 "         |
| Total solids not fat, . . . . . | 9.221 "          |
| Fat, . . . . .                  | 4.013 "          |
| Milk sugar, . . . . .           | 6.997 "          |
| Albuminoids, . . . . .          | 2.058 "          |
| Ash, . . . . .                  | 0.21 "           |

It contains, then, nitrogenous material, carbohydrates, salts and water.—all the elements essential to repair tissue waste, to supply new material for growth and to maintain body-heat, or, in other words, to constitute a perfect aliment; and these, too, are so proportioned in the combination as to meet the demands most easily and completely.

It must not be supposed, however, that the elements are uniformly present in the same proportion. On the contrary, the fluid varies both at different periods of lactation and in different individuals.

This fact is the most striking feature of the above observer's work, which shows that the most changeable constituent is the albumen, varying from a maximum of 4.86 per cent. to a minimum of 0.85; the next are the fats, salts, the maximum being about three times the minimum, and the least the sugar. The latter, in fact, varies but little from a standard of about 7 per cent. The function of albumen is nutritive, that of milk sugar calorifacient; hence the point seems to be that nature, while allowing a wide range of oscillation in the rapidity of tissue building, carefully provides an available fuel for the constant maintenance of animal heat, the supply of caloric due to cerebral impulses and self-originated locomotions being extremely small in early infancy.

In seeking a substitute for human milk, one naturally turns to the domestic animals for the source of supply. Between the milk of the ass, cow, goat and ewe there is little choice, so far as composition is concerned, though, perhaps, asses' milk resembles that of women a little more closely than the others; nevertheless, cows' milk is usually selected because, being plentiful, it is easily obtained and cheap.

Cows' milk has a specific gravity of 1.029 (market milk), is more rich looking, that is, whiter and more opaque than human milk, is slightly acid in reaction unless perfectly fresh from pasture-fed animals, when it may be neutral or alkaline, and contains:—

|                                 |                |
|---------------------------------|----------------|
| Water, . . . . .                | 87.7 per cent. |
| Total solids, . . . . .         | 12.3 “         |
| Total solids not fat, . . . . . | 8.48 “         |
| Fat, . . . . .                  | 3.75 “         |
| Milk-sugar, . . . . .           | 4.42 “         |
| Albuminoids, . . . . .          | 3.42 “         |
| Ash, . . . . .                  | 0.64 “         |

Comparing this analysis with that previously given, it is readily seen that the two fluids differ in specific gravity and reaction, and that cows' milk contains more nitrogenous material but less fat and much less sugar than woman's milk.

The nitrogenous material differs in quality as well as in quantity. König, in a number of analyses that closely correspond with those of Leeds, divides the nitrogenous constituent into three groups, namely, caseine, albumen and albuminoids, basing the division upon the different effects of coagulating agents.

Upon this point Leeds remarks: "Whilst by present modes of analysis the separation of the so-called caseine from the so-called albumen is not accurately performed, yet the results are approximately correct (König's), and have a very great value in pointing out the most important of all the differences between the two secretions, which is, that the fraction of the total albuminoids in cows' milk which is coagulable by acids is far greater (perhaps four times) than the non-coagulable part.

"In woman's milk, on the contrary, the reverse is true, and the non-coagulable part much exceeds (perhaps by more than twice) the coagulable portion."

This difference is readily tested by adding rennet to the two fluids. In the case of cows' milk the caseine is coagulated into large, firm masses, while with human milk a light, loose curd is formed. In the stomach the acid gastric juice has the same effect, producing in the first instance a coagulum most difficult to digest; in the other, one readily attacked and broken down by the gastrointestinal solvents.

These chemical and physical properties of cows' milk can be altered by various methods of preparation, and unless this be done there are few instances in which it will not prove a poor substitute for the natural food.

Condensed milk is frequently recommended by physicians and largely used by the laity, on their own authority, in bottle-feeding. It keeps better than cows' milk and is supposed to be more readily digested by young infants. The latter supposition is a mistaken one, and arises from the overlooked fact that condensed milk is always given dissolved in a large proportion of water, while cows' milk is too frequently used insufficiently diluted or otherwise improperly prepared. The author is convinced of the accuracy of this state-

ment from a number of years' close study of the subject, during which he has seen but two or three instances where properly prepared cows' milk was unsuitable, provided condensed milk could be digested; and he has had little difficulty in substituting the former for the latter when the coöperation of the mother and nurse was obtained.

Condensed milk contains a large proportion of sugar, forms fat quickly, and thus makes large babies; sugar also counteracts the tendency to constipation,—often a troublesome complication of hand-feeding. These advantages are unquestioned, and, together with the ease of preparation, are those which place it so high in the esteem of monthly nurses. It is equally true that, as a food, it does not contain enough nutrient material to supply the wants of a growing baby. According to Meigs<sup>24</sup> analysis, the mixture of condensed milk ordinarily used—one teaspoonful to six table-spoonfuls of water—yields:—

|                    |        |           |
|--------------------|--------|-----------|
| Water, . . . . .   | 92.673 | per cent. |
| Fat, . . . . .     | 1.095  | "         |
| Caseine, . . . . . | .868   | "         |
| Sugar, . . . . .   | 5.206  | "         |
| Ash, . . . . .     | .158   | "         |

It is apparent that the amount of caseine and fat is much less than in either human or cows' milk, and of sugar less than in human milk. The addition of a large proportion of condensed milk would remove these faults, but at the same time would increase the quantity of sugar to a point incompatible with perfect digestion. Again, more than half of the saccharine ingredient of this preparation is cane-sugar, added for the purpose of preservation; and this material is very liable, when in excess, to ferment in the alimentary canal, giving rise to irritant products that impede digestion.

Infants fed upon condensed milk though fat, are pale, lethargic and flabby; although large, are far from strong; have little power to resist diseases; cut their teeth late, and are very likely to drift into rickets before the end of the first year. Without going further into detail, it is never safe to bring up a child solely on this food. For a temporary change of diet, and as a substitute during traveling or under circumstances in which sound cows' milk cannot be obtained, it may be resorted to with advantage.

Condensed milk, too, not unfrequently undergoes decompo-

sition when long kept, or when packed in imperfect cans, and thus becomes utterly unfit for use.

The farinaceous substances so often selected, especially by the poor, to replace breast-milk are not only bad foods, but have both directly and indirectly a deleterious effect upon the processes of nutrition.

They are bad food for two reasons. First, they differ materially from human milk in chemical composition. For example, in arrowroot, which is the favorite, the proportion of the nitrogenous to the calorific element is as one to twenty, while in human milk it is one to about five. Secondly, the calorific principle, starch, must be converted into sugar before it can be absorbed. This change is accomplished in the body by the saliva and pancreatic juices,—secretions that are not fully established until the fourth month.

While the starch lies undigested in the gastro-intestinal canal, it is subject to fermentation, resulting in the formation of irritant products that rapidly induce catarrh of the mucous membrane, a condition directly interfering with the digestion and absorption of food. Again, perfect nutrition demands rapid waste and removal of effete tissues as well as repair of the same. This is effected by oxidation. Now sugars are known to have a much greater affinity for oxygen than albuminates, and when the diet consists of farinaceous material, the little sugar formed and absorbed appropriates oxygen that would otherwise go toward the removal of waste, and so retards the necessary changes.

Farinaceous food, as such, is never admissible before the fourth month; earlier, it is only to be employed as an addition to milk preparations for its mechanical action, to be mentioned later.

The nutrient value of the cereals and their products as they exist in so-called “infants’ foods,” has been imperfectly determined. They are undoubtedly useful as mechanical attenuants; but it is very questionable whether any of them, unless prepared with milk, can permanently meet the demands of nutrition. At the same time it is quite probable that the soluble albuminoid substances obtained by Liebig’s process have a food value of their own, making them more serviceable than the starches.

b. The quantity of food to be allowed each day varies with the appetite and age. Some infants habitually eat little, others much ;

as both thrive, the question of the correct amount in a given case must be answered by observation. So long as the child develops with normal rapidity and keeps well, he may be allowed to eat as much or as little as he wants; for, if food of proper strength be given at proper intervals, the instinctive cravings of hunger, since they represent the wants of the system, rarely lead to excess in either direction. Nevertheless it is well to have some guide.

During the first four weeks, infants generally require from twelve and a half to sixteen fluidounces of food; in the second and third months, about twenty-four fluidounces, and from this time to the twelfth month from two to two and a half or even three pints. After the twelfth month the quantity depends upon whether additions be made to the diet or milk food be used exclusively. When the daily amount reaches three pints, the limit of the capacity of the stomach is usually attained; and the greater demand for nutriment, as growth advances month by month, must be met by adding to the strength of the food rather than by increasing its bulk. These two factors,—strength and quantity,—are intimately associated throughout the whole period of infancy, and in the earlier months a mere increase in the latter is not always sufficient to maintain the balance of nutrition.

As a rule, infants are over-fed so far as quantity is concerned; and this opens the very interesting question of the normal capacity of the stomach at different ages. Rotch<sup>5</sup> has recently written an important paper upon the subject. He states that, by actual measurement, the stomach of an infant five days old holds 25 c.c. or six and a quarter fluidrachms,—a quantity very far short of that usually forced upon the babe during the first week. Frowlowsky's investigations show that the extent of increase in the stomach capacity with advancing age can be represented by the ratio of one for the first week, to two and one-half for the fourth, and three and one-fifth for the eighth; for the twelfth week it is only three and one-third; for the sixteenth three and four-sevenths, and for the twentieth three and three-fifths.

There is thus a very rapid growth during the first two months of life, while in the third, fourth and fifth months the increase is slight. Guided by these data, the quantity of food should be rapidly augmented during the first six or eight weeks of life, and then held at the same quantity up to the fifth or sixth month;

another considerable increase is also demanded between the sixth and the tenth months.

Ssnitkin, of St. Petersburg, after a series of careful investigations, has found that the greater the infant's weight the larger the gastric capacity. He holds that one one-hundredth of the initial weight should be taken as the starting quantity of food for each meal, and to this should be added one gramme (15 minims) for each day of life.

Thus, supposing the initial weight to be 3000 grammes, or about 6 pounds,  $\frac{1}{100}$  of 3000 grammes equals 30 grammes, or about  $\frac{1}{2}$  oz at a meal; at fifteen days the sum is 30 + 15 or 45 grammes, about  $\frac{3}{4}$  oz per meal; and at thirty days 30 + 30 or 60 grammes, about  $\frac{1}{2}$  oz per meal. This is an admirable rule for the earlier weeks of life, and if carried out will be found to correspond quite closely with the teachings of clinical experience in regard to the feeding of more advanced infancy.

Rotch gives, in his paper already alluded to, a table which corresponds very closely with the statements of Ssnitkin:—

The average initial weight of infants is about 6–8 pounds.

The average normal gain per day in the first five months is about one ounce.

#### GENERAL RULES FOR FEEDING.

| AGE.  | Intervals of Feeding. | Average Amount at Each Feeding. | Average Amount in 24 Hours. |
|---|-----------------------|---------------------------------|-----------------------------|
| 1st week                                      | 2 hours.              | 1 ounce.                        | 10 ounces.                  |
| 1–6 weeks                                     | 2½ hours.             | 1½ to 2 ounces.                 | 12 to 16 ounces.            |
| 6–12 weeks, and possibly to 5th or 6th months | 3 hours.              | 3 to 4 ounces.                  | 18 to 24 ounces.            |
| At 6 months                                   | 3 hours.              | 6 ounces.                       | 36 ounces.                  |
| At 10 months                                  | 3 hours.              | 8 ounces.                       | 40 ounces.                  |

Special feeding-tubes or bottles, designed to hold only the exact quantity for the different ages, are suggested by Rotch.

These observations certainly open a fruitful field for investiga-

tion, and I hope soon to be able to state by actual measurement the capacity of the stomach at different ages.

c. The object to be accomplished in the preparation of cows' milk is to make it resemble human milk as much as possible in chemical composition and physical properties. To do this, it is necessary to reduce the proportion of caseine, to increase the proportion of fat and sugar, and to overcome the tendency of the caseine to coagulate into large, firm masses upon entering the stomach.

Dilution with water is all that need be done to reduce the amount of caseine to the proper level; but as this diminishes the already insufficient fat and sugar, it is essential to add these materials to the mixture of milk and water. Fat is best added in the form of cream, and of the sugars, either pure white loaf sugar or sugar of milk may be used, though the latter is greatly preferable, as it is little apt to ferment and contains some of the salts of milk, which are of nutritive value.

The risk of firm clotting may be anticipated by the addition of an alkali, or a small quantity of some thickening substance, as barley-water, gelatine, or one of the digestible prepared foods.

Lime-water is the alkali usually selected. It acts by partially neutralizing the acid of the gastric juice, so that the caseine is coagulated gradually and in small masses, or passes, in great part unchanged, into the intestine to be there digested by the alkaline secretions. As it contains only a half a grain of lime to the fluid-ounce, the desired result cannot be attained, unless at least a third part of the milk mixture be lime-water. The quantity often used—one or two teaspoonfuls to the bottle of food—has no effect beyond neutralizing the natural acidity of the milk itself. When lime-water is constantly employed, it becomes quite an item of expense if procured from the drug shop; this outlay is unnecessary, for it can be made quite as well in the nursery. Take a piece of unslaked lime as large as a walnut, drop it into two quarts of filtered water contained in an earthen vessel, stir thoroughly, allow to settle and use only from the top,—replacing the water and stirring as consumed.

Instead of lime-water, two to four grains of bicarbonate of sodium may be added to each bottle or, better still, from five to fifteen drops of the saccharated solution of lime.



This solution, officinal in the British Pharmacopœia, under the title of *liquor calcis saccharatus*, is made in the following way:—

Take of—

|                                     |           |
|-------------------------------------|-----------|
| Slaked lime, . . . . .              | 1 ounce.  |
| Refined sugar, in powder, . . . . . | 2 ounces. |
| Distilled water, . . . . .          | 1 pint.   |

Mix the lime and sugar by trituration in a mortar. Transfer the mixture to a bottle containing the water, and having closed this with a cork, shake it occasionally for a few hours. Finally separate the clear solution with a siphon, and keep in a stoppered bottle.

Thickening substances—attenuants—act purely mechanically by getting, as it were, between the particles of caseine during coagulation, preventing their running together and forming a large, compact mass.

Of these materials, barley-water is perhaps the best. To prepare it, put two good teaspoonfuls of washed pearl barley with a pint of cold filtered water into a saucepan. Boil slowly down to two-thirds and strain. The liquid obtained does not possess the disadvantages of farinaceous foods generally. To be efficient, it must be used as a diluent instead of and in the same proportions as water.

Gelatine is prepared in the following way: Put a piece of plate gelatine, an inch square, into half a tumblerful of cold water, and let it stand for three hours; then turn the whole into a teacup, place this in a saucepan half full of water and boil until the gelatine is dissolved. When cold this forms a jelly; from one to two teaspoonfuls may be added to each bottle of milk-food.

When an “infant’s food” is used to act mechanically, care should be taken to select one in which the starch has been converted into dextrine and grape sugar by the process of manufacture. The articles known as “Mellin’s Food” and “Horlick’s Food” can be relied upon. One teaspoonful of these dissolved in a tablespoonful of hot water, and added to each portion of food, makes a very easily digested mixture.

For the successful management of children, the practitioner must not only be familiar with the theory of feeding, but must be able to write out precise directions for the preparation of the food. To this end a schedule of the diet of an infant from birth upward, with a sketch of the modifications that have to be made most frequently, will serve as a useful guide.

## Diet during the first week :—

|                        |        |
|------------------------|--------|
| Cream, . . . . .       | ℥ij.   |
| Whey, . . . . .        | ℥iij.  |
| Water (hot), . . . . . | ℥iij.  |
| Milk sugar, . . . . .  | gr. x. |

For each portion; to be given every two hours from 5 A.M. to 11 P.M., and in some cases once or twice at night, amounting to ℥xij. of food per diem.

To make whey, take one-half pint of fresh milk heated as hot as can be agreeably borne by the mouth (about 140° to 150° F.), add one teaspoonful and a half of wine of pepsin or a teaspoonful of Fairchild's essence of pepsin and stir just enough to mix. Let the mixture stand in a warm place until firm coagulation has taken place. Next beat up the curd until it is finely divided and strain. Whey contains in solution the sugar and the salts (the mineral constituents) of the milk, and holds also in suspension a considerable portion of caseine and fat which passes through the strainer.

## Diet from the second to the sixth week :—

|                       |         |
|-----------------------|---------|
| Milk, . . . . .       | ℥ss.    |
| Cream, . . . . .      | ℥iij.   |
| Milk-sugar, . . . . . | gr. xv. |
| Water, . . . . .      | ℥ij.    |

For one portion; to be given every two hours from 5 A.M. to 11 P.M.; amounting to ℥xxvij of food per diem.

## Diet from the sixth week to the end of the second month :—

|                          |           |
|--------------------------|-----------|
| Milk, . . . . .          | ℥j. ℥ij.  |
| Cream, . . . . .         | ℥ss.      |
| Sugar of milk, . . . . . | gr. xxx.  |
| Water, . . . . .         | ℥ij. ℥ij. |

For each portion; to be given every two hours; amounting to ℥xxx. per diem.

## Diet from the beginning of the third month to the sixth month :—

|                          |        |
|--------------------------|--------|
| Milk, . . . . .          | ℥ijss. |
| Cream, . . . . .         | ℥ss.   |
| Sugar of milk, . . . . . | ℥j.    |
| Water, . . . . .         | ℥ij.   |

For each portion; to be given every two and a half hours or ℥xxxij. per diem.

## Diet during the sixth month, six meals daily from 6 or 7 A.M. to 9 or 10 P.M.

## Morning and midday bottles each :—

|                          |        |
|--------------------------|--------|
| Milk, . . . . .          | ℥ivss. |
| Cream, . . . . .         | ℥ss.   |
| Mellin's Food, . . . . . | ℥j.    |
| Hot water, . . . . .     | ℥ij.   |

Dissolve the Mellin's Food in the hot water and add, with stirring, to the previously mixed milk and cream.

Other bottles each :—

|                |   |   |   |   |   |   |   |         |
|----------------|---|---|---|---|---|---|---|---------|
| Milk,          | . | . | . | . | . | . | . | f3ivss. |
| Cream,         | . | . | . | . | . | . | . | f3ss.   |
| Sugar of milk, | . | . | . | . | . | . | . | 3j.     |
| Water,         | . | . | . | . | . | . | . | f3j.    |

This gives an equivalent of f3xxxvj of food in a day.

In the seventh month the Mellin's Food may be increased to two teaspoonfuls and given three times daily.

Throughout the eighth and ninth months five meals a day will be sufficient.

First meal at 7 A.M. :—

|                |   |   |   |   |   |   |   |        |
|----------------|---|---|---|---|---|---|---|--------|
| Milk,          | . | . | . | . | . | . | . | f3vjss |
| Cream,         | . | . | . | . | . | . | . | f3ss.  |
| Sugar of milk, | . | . | . | . | . | . | . | 3j.    |
| Water,         | . | . | . | . | . | . | . | f3j.   |

Second meal at 10.30 A.M. Milk, cream and water in the same proportion ; Mellin's Food one tablespoonful.

Third meal at 2 P.M.—Same as second.

Fourth meal at 6 P.M.—Same as second.

Fifth meal at 10 P.M.—Same as first.

This gives f3xl. of food per diem.

Instead of Mellin's Food, a teaspoonful of "flour-ball" may be added. To make this material, take a pound of good wheat flour, unbolted if possible. Tie it up very tightly in a strong pudding-bag, place it in a saucepan of water and boil constantly for ten hours. When cold, remove the cloth, cut away the soft outer covering of dough that has been formed, and reduce the hard, baked interior by grating. In the yellowish-white powder obtained, almost all the starch has been converted into dextrine by the process of cooking, and the proportion of the nitrogenous principle to the calorific is as one to five,—nearly the same as in human milk.

Two meals of flour-ball daily—say the second and fourth—are all that can be digested. To prepare these, rub one teaspoonful of the powder with a tablespoonful of milk into a smooth paste, then add a second tablespoonful of milk, constantly rubbing until a cream like mixture is obtained. This is poured into eight ounces of hot milk, stirring well, and is then ready for use. The other meals should be composed of milk, cream, sugar of milk and water, as already given.

Mellin's Food and flour-ball may be substituted by any one

of the infant's foods in which the starch has been converted, by Liebig's process, into dextrine and grape-sugar, or by oatmeal or barley. A preparation of the latter, highly recommended by Eustace Smith, under the name of barley jelly, is a digestible food. In making it put two tablespoonfuls of washed pearl barley with a pint and a half of water, and slowly boil down to a pint; next strain out the barley and let the liquid settle into a jelly. Two teaspoonfuls of this, dissolved in eight fluidounces of warmed and sweetened milk, are enough for a single feeding, and such a meal may be allowed twice a day.

Diet for the tenth and eleventh months:—

First meal, 7 A.M.:—

|                                  |   |   |   |   |   |   |   |   |          |
|----------------------------------|---|---|---|---|---|---|---|---|----------|
| Milk,                            | . | . | . | . | . | . | . | . | f3vijss. |
| Cream,                           | . | . | . | . | . | . | . | . | f3ss.    |
| Mellin's Food,                   | . | . | . | . | . | . | . | . | 3ss.     |
| (Or flour-ball or barley jelly), | . | . | . | . | . | . | . | . | 5ij.     |
| Water,                           | . | . | . | . | . | . | . | . | f3j.     |

(To be used only when Mellin's Food is employed.)

Second meal, 10.30 A.M.—A breakfast-cupful of warm milk (f3viii).

Third meal, 2 P.M.—The yelk of an egg lightly boiled, with stale bread-crumbs.

Fourth meal, 6 P.M.—Same as first.

Fifth meal, 10 P.M.—Same as second.

On alternate days the third meal may consist of a teacupful (f3vj) of beef-tea, containing a few stale bread crumbs.

Beef tea for an infant is made in the following way:—Half a pound of fresh rump steak, free from fat, is cut into small pieces and put, with one pint of cold water, into a covered tin saucepan. This must stand by the side of the fire for four hours, then be allowed to simmer gently (never boil) for two hours, and, finally, be thoroughly skimmed to remove all grease.

A further variation can be made by occasionally using mutton, chicken or veal broth instead of beef tea.

As much more difficulty is experienced in feeding infants during the first twelve months than during the second, it would be well to pause here to consider what had best be done in case the food described should disagree.

If, after feeding, vomiting occur, with the expulsion of large firm clots of caseine, the effect of adding lime-water or barley-water must be tried.

For instance, at the age of six weeks make each bottle of:—

|                |   |   |   |   |   |   |   |   |          |
|----------------|---|---|---|---|---|---|---|---|----------|
| Milk,          | . | . | . | . | . | . | . | . | ℥j. ℥ij. |
| Cream,         | . | . | . | . | . | . | . | . | ℥ss.     |
| Sugar of Milk, | . | . | . | . | . | . | . | . | 3ss.     |
| Lime-water,    | . | . | . | . | . | . | . | . | ℥j. ℥ij. |

Or of:—

|                |   |   |   |   |   |   |   |   |          |
|----------------|---|---|---|---|---|---|---|---|----------|
| Milk,          | . | . | . | . | . | . | . | . | ℥j. ℥ij. |
| Cream,         | . | . | . | . | . | . | . | . | ℥ss.     |
| Sugar of Milk, | . | . | . | . | . | . | . | . | 3ss.     |
| Barley-water,  | . | . | . | . | . | . | . | . | ℥j. ℥ij. |

Sometimes, particularly if there be diarrhœa, boiling makes the milk more digestible, and in this condition it may be used instead of fresh milk in either of the above mixtures. Condensed milk, too, can be employed temporarily, making each portion of:—

|                 |   |   |   |   |   |   |   |   |        |
|-----------------|---|---|---|---|---|---|---|---|--------|
| Condensed Milk, | . | . | . | . | . | . | . | . | ℥j.    |
| Cream,          | . | . | . | . | . | . | . | . | ℥ss.   |
| Hot water,      | . | . | . | . | . | . | . | . | ℥ijss. |

Should further alteration be necessary, goats' or asses' milk may be substituted for cows' milk, the strong odor of the former and the laxative properties of the latter being removed by boiling. One ass is capable of nourishing three children for the first three months of life, two children for the fourth and fifth months, and one child after this period to the ninth month. The milk should be used warm from the udder.

“Strippings” is another good substitute for cows' milk. It is obtained by remilking the cow after the ordinary daily supply has been drawn, and contains much cream and but little curd. Assimilable proportions of this are:—

|             |   |   |   |   |   |   |   |   |      |
|-------------|---|---|---|---|---|---|---|---|------|
| Strippings, | . | . | . | . | . | . | . | . | ℥j.  |
| Water,      | . | . | . | . | . | . | . | . | ℥ij. |

And if the small amount of caseine in such a mixture be still undigested:—

|               |   |   |   |   |   |   |   |   |       |
|---------------|---|---|---|---|---|---|---|---|-------|
| Strippings,   | . | . | . | . | . | . | . | . | ℥jss. |
| Barley-water, | . | . | . | . | . | . | . | . | ℥jss. |

Another good food is that recommended by Dr. A. V. Meigs. It consists of a combination of two parts of the cream, containing from fourteen to sixteen per cent. of fat, one part average milk, two parts lime-water, and three parts sugar-water, the latter consisting of seventeen and three-fourths drachms of milk-sugar to one pint of water. This makes an alkaline mixture with the percentage of its ingredients closely corresponding to human milk.

When, in spite of careful preparation, all of these foods give rise to indigestion with fever, and the expulsion, by vomiting and diarrhœa, of hard curds from the stomach and intestines, the expedient of predigesting the milk must be resorted to. There are several ways of artificially digesting milk.

One plan, recommended by Eustace Smith, is to add to each fluidounce of milk five grains of pure pepsin and four drops of dilute muriatic acid; digest in a water-bath, at a temperature of 100° F., until the mixture becomes clear; then neutralize with bicarbonate of sodium, and the milk is ready for use.

Another method is to peptonize the milk by pancreatin. That manufactured under the name of *Extractum pancreatis*, by Fairchild Brother & Foster, has proved most efficient in the author's hands. To accomplish this artificial digestion, put into a clean quart bottle five grains of *extractum pancreatis*, fifteen grains of bicarbonate of sodium, and four fluidounces of cool, filtered water; shake thoroughly together, and add a pint of fresh, cool milk. Place the bottle in water so hot that the whole hand can be held in it for a minute without discomfort, and keep the bottle there for exactly thirty minutes. At the end of that time put the bottle on ice to check further digestion and keep the milk from spoiling. The fluid obtained, while somewhat less white in color than milk, does not differ from it in taste; if, however, an acid be added, the caseine, instead of being coagulated into large, firm curds, takes the form of minute, soft flakes, or readily broken down feathery masses of small size. When the process is carried just to the point described, the caseine is only partly converted into peptone; but every succeeding moment of continued warmth lessens the amount of caseine until peptonization is complete. Then the liquid is grayish yellow in color, has a distinctly bitter taste, and shows no coagulation whatever on the addition of an acid. This artificial digestion, therefore, may be carried just as far as circumstances indicate, although it is ordinarily best to stop it short of complete conversion, as children object to the markedly bitter taste and often on account of it absolutely refuse the food. Partial peptonization, too, is usually sufficient to adapt the milk to ready assimilation. To seize the proper moment for arresting the process, the person conducting it must be told to taste the milk from time to time, and as soon as the least bitterness is appreci-

able to remove the bottle from the hot water and place it upon ice for cooling and use. Such milk may be sweetened with sugar or milk, and given pure or diluted with water. Thus, for an infant of six weeks each meal may consist of:—

|                  |   |   |   |   |   |   |   |       |
|------------------|---|---|---|---|---|---|---|-------|
| Peptonized milk, | . | . | . | . | . | . | . | f3ij. |
| Sugar of milk,   | . | . | . | . | . | . | . | 3ss.  |
| Water,           | . | . | . | . | . | . | . | f3i.  |

To this cream may be added when desirable, and by diminishing the quantity of water and increasing that of milk the strength of the food may be made greater at any time.

Although every precaution be taken, the last of a quantity of predigested food is very apt to grow bitter; and if the attendants will take the trouble, it is much better to peptonize every meal separately. This is readily done by ordering a number of powders of pancreatin and bicarbonate of sodium so proportioned that each packet shall contain the proper amounts for one bottle of food.

For example :—

R. Ext. pancreatis, . . . . . gr. ix.  
Sodii bicarb, . . . . . gr. xxiv.  
M. et ft. chart. (waxed papers) No. xij.  
S.—Put one powder into a nursing-bottle with two fluidounces of filtered water and two fluidounces of fresh sweet milk; shake together and keep warm in a water-bath for about half an hour before feeding; sweeten with half a tea-spoonful of milk sugar.

The great advantages of partial peptonization are that the necessity for lime-water, barley-water and thickening substances to keep apart the curd is done away with, and that when the digestive disturbance requiring a careful preparation of food is removed, an ordinary milk diet can be gradually resumed by regularly diminishing the time artificial digestion is allowed to progress. This changes the caseine in a less and less degree until finally it is taken in its natural form.

Instead of this ordinary peptonizing process, I have for the past year or more employed the "peptogenic milk powder" prepared by the chemists already referred to. This powder contains a digestive ferment—pancreatin—an alkali—bicarbonate of sodium—and a due proportion of milk-sugar.

The mode of employment is as follows :—

|                         |   |   |   |   |   |   |   |   |   |   |   |   |   |   |      |
|-------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|------|
| <b>Take of</b>          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |      |
| Milk,                   | .   | . | . | . | . | . | . | . | . | . | . | . | . | . | 7ij. |
| Water,                  | .   | . | . | . | . | . | . | . | . | . | . | . | . | . | ℥vj. |
| Cream,                  | .   | . | . | . | . | . | . | . | . | . | . | . | . | . | ʒss. |
| Peptogenic milk powder. | Measure provided with each can of powder. |   |   |   |   |   |   |   |   |   |   |   |   |   |      |

This mixture is to be heated over a brisk flame to a point that can be comfortably sipped by the preparer (140 to 150° F.) and kept at this heat for six minutes. When properly prepared, the resultant, so-called "humanized milk," presents the albuminoids in a minutely coagulable and digestible form, has an alkaline reaction, contains the proper proportion of salts, milk-sugar, and fat, and has the appearance of human milk.

Leeds gives the following analysis of this prepared milk:—

|                        |                |
|------------------------|----------------|
| Water, . . . . .       | 86.2 per cent. |
| Fat, . . . . .         | 4.5 "          |
| Milk-sugar, . . . . .  | 7. "           |
| Albuminoids, . . . . . | 2. "           |
| Ash (salts), . . . . . | 0.3 "          |

This corresponds very closely with his average analysis of human milk.

In using this powder, too, one can readily return to a plain milk diet by gradually shortening the time of heating; in other words, by slowly diminishing predigestion.

Sometimes milk, in every form and however carefully prepared, ferments soon after being swallowed and excites vomiting, or causes great flatulence and discomfort, while it affords little nourishment. With these cases the best plan is to withhold milk entirely for a time and try some other form of food. The following are good substitutes:—

|  |        |
|--|--------|
| Mellin's Food, . . . . .   | 3j.    |
| Hot water, . . . . .   | f℥ij.  |
| For each portion; to be given every two hours at the age of six weeks. |        |
| Veal broth ( $\frac{1}{2}$ lb. of meat to the pint), . . . . .         | f℥jss. |
| Barley-water, . . . . .  | f℥jss. |
| For one portion.   |        |
| Whey, . . . . .  | f℥jss. |
| Barley-water, . . . . .  | f℥jss. |
| Sugar of milk, . . . . .   | 3ss.   |

A teaspoonful of the juice of raw beef every two hours will usually be retained when every thing else is rejected.

Such foods are only to be used temporarily until the tendency to fermentation within the alimentary canal ceases; then milk may be gradually and cautiously resumed.

When infants who are approaching the end of the first year become affected with indigestion, it is often sufficient to reduce the strength and quantity of the food to a point compatible with diges-



tive powers. For instance, at eight months the food may be reduced to that proper for a healthy child of six months, or even less. Here, too, predigestion of the food is most serviceable. If a few grains of extractum pancreatis be added to a gobletful of thick, well-boiled starch gruel, at a temperature of 100° F., the gelatinous mucilage quickly grows thinner and soon is transformed into a fluid, the starch having been rendered soluble by the action of the diastase contained in the pancreatin; by still longer contact, the hydrated starch is converted into dextrine and sugar. Advantage may be taken of this property to render the foods containing starch assimilable. Thus, to a mixture of barley jelly and milk, *e. g.*:—

|                |   |   |   |   |   |   |   |         |
|----------------|---|---|---|---|---|---|---|---------|
| Barley jelly,  | . | . | . | . | . | . | . | 3ij.    |
| Sugar of milk, | . | . | . | . | . | . | . | 3j.     |
| Warm milk,     | . | . | . | . | . | . | . | ℥3viii. |

add three grains of extractum pancreatis, and five grains of bicarbonate of sodium, and keep warm for a half an hour before feeding.

The same process may be employed with food containing oatmeal, arrowroot or wheaten flour, with the effect of converting the starchy elements into digestible products and without materially altering the taste.

When the infant has arrived at an age to take meat broths, these too may be readily peptonized when digestion is enfeebled. The recipe for peptonized beef tea, which may be taken for an example, is:—

To one quarter of a pound of minced raw beef, entirely free from fat, add one half pint of cold water; cook over a slow fire, with constant stirring, until it has boiled a few minutes. Then pour off the liquor and beat or rub the meat to a paste. Put the latter into a jar with one half pint of cold water and pour in the liquor previously obtained. Add to this mixture thirty grains of extractum pancreatis and twenty grains of bicarbonate of sodium; shake all well together and keep at a temperature of about 110° F., stirring occasionally for three hours. Next, boil quickly, strain, and serve as required.

Returning to the regimen of the healthy infant, it will be found that after the first year far less change is required in the food from month to month.

Diet from the twelfth to the eighteenth month, five meals per day:—

First meal, 7 A.M.—A slice of stale bread, broken and soaked in a breakfastcup (f3viiij) of new milk.

Second meal, 10 A.M.—A teacup of milk (f3vj) with a soda biscuit or thin slice of buttered bread.

Third meal, 2 P.M.—A teacup of beef tea (f3vj) with a slice of bread. One good tablespoonful of rice and milk pudding.

Fourth meal, 6 P.M.—Same as first.

Fifth meal, 10 P.M.—One tablespoonful of Mellin's food with a breakfastcupful of milk.

To alternate with this:—

First meal, 7 A.M.—The yolk of an egg lightly boiled, with bread crumbs; a teacupful of new milk.

Second meal, 10 A.M.—A teacupful of milk with a thin slice of buttered bread.

Third meal, 2 P.M.—A mashed, boiled potato, moistened with four tablespoonfuls of beef tea; two good tablespoonfuls of junket.

Fourth meal, 6 P.M.—A breakfastcupful of new milk with a slice of bread broken up and soaked in it.

Fifth meal, 10 P.M.—Same as second.

The fifth meal is often unnecessary, and sleep should never be disturbed for it; at the same time should the child awake an hour or more before the first meal, he must break his fast upon a cup of warm milk, and not be allowed to go hungry until the set breakfast hour.

Diet from eighteen months to the end of two and one-half years, four meals a day:—

First meal, 7 A.M.—A breakfastcupful of new milk; the yolk of an egg lightly boiled; two thin slices of bread and butter.

Second meal, 11 A.M.—A teacupful of milk with a soda-biscuit.

Third meal, 2 P.M.—A breakfastcupful of beef tea, mutton or chicken broth; a thin slice of stale bread; a saucer of rice and milk pudding.

Fourth meal, 6.30 P.M.—A breakfastcupful of milk with bread and butter.

On alternate days:—

First meal, 7 A.M.—Two tablespoonfuls of thoroughly cooked oatmeal or wheaten grits with sugar and cream; a teacupful of new milk.

Second meal, 11 A.M.—A teacupful of milk with a slice of bread and butter.

Third meal, 2 P.M.—One tablespoonful of underdone mutton pounded to a paste; bread and butter, or mashed baked potato, moistened with good plain dish gravy; a saucer of junket.

Fourth meal, 3.30 P.M.—A breakfastcupful of milk, a slice of soft milk toast, or a slice or two of bread and butter.

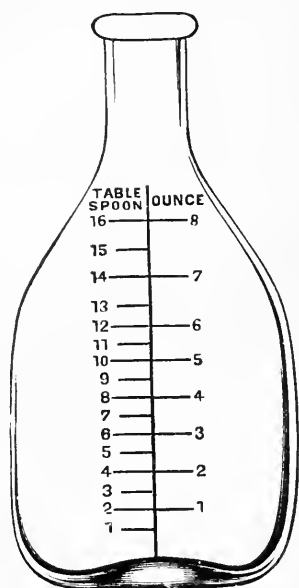
When sickness supervenes, all that is ordinarily necessary is a reduction of the diet to plain milk, or milk with Mellin's Food.

An important point often neglected is the matter of drink. Even the youngest infant requires water occasionally, and the demand increases with age. The water must be as pure as possible, and should not be too cold, although, in the heat of summer, bits of ice and water moderately cooled by ice can be allowed without harm.

The foregoing schedule must of course be regarded only as an average. Many children can bear nothing but milk food up to the age of two or even three years, and, provided enough be taken, no fear for their nutrition need be entertained. The rule to adopt is, if a child be thriving on milk he is never to be forced to take additional food merely because a certain age has been reached; let the healthy appetite be the guide.

d. Success in hand feeding depends quite as much on the administration as upon the preparation of the food.

From birth up to such time as broth, bread, and eggs are added to the diet, all the food should be taken from a bottle; and even after this, as the bottle is a comfort, and insures slow feeding, it may be allowed for milk preparations until the child of his own accord tires of it. The only feeding apparatus to be admitted to the nursery is the simple bottle and tip. The bottle represented in the accompanying figure was prepared at my suggestion by Mr. J. J. Ottenger, of Philadelphia. Its interior surface presents no



GRADUATED NURSERY BOTTLE.

angles for the collection of milk, it is easily cleaned, and the graduated scale is most convenient for nursery use.

All complicated arrangements of rubber and glass tubing are not only an abomination, but a fruitful source of sickness and death. Rather than use them, it is far better to feed the infant with a spoon. In England a bottle with a long rubber-tube is almost universally employed. Should this be abandoned and a simple bottle and a rubber tip used, the objections of many British authors to bottle-feeding would vanish.

The bottle shaped as above must be of transparent flint glass, so that the slightest foulness can be detected at a glance, and may vary in capacity from six to twelve fluidounces, according to the age of the child. Two should be on hand at a time, to be used alternately. Immediately after a meal, the bottle should be thoroughly washed out with scalding water, filled with a solution of bicarbonate or salicylate of sodium—5j either to a pint of water—and thus allowed to stand until next required; then the soda solution being emptied, it must be thoroughly rinsed with cold water before receiving the food. The tips or nipples, of which there should also be two, must be composed of soft, flexible India-rubber, and a conical shape is to be preferred, as being more readily everted and cleaned; the opening at the point must be free, but not large enough to permit the milk to flow in a stream without suction. At the end of each feeding the nipple must be removed at once from the bottle, cleansed externally by rubbing with a stiff brush wet with cold water, everted and treated in the same way, and then placed in cold water and allowed to stand in a cool place until again wanted.

While taking these precautions for perfect cleanliness, the nurse must satisfy herself of their efficacy by smelling both the bottle and the tip just before they are used, to be sure of the absence of any sour odor.

Rotch has devised a set of feeding tubes accurately made, of different calibres so as to hold the exact quantity of food appropriate to the several periods of infancy, as stated in his tables. The same idea can of course be carried out by the bottle just mentioned.

Next to cleanliness of the feeding apparatus, it is important to insist upon the separate preparation of each meal immediately

before it is to be given. The practice of making in the morning the whole day's supply of food, though it save trouble, is a most dangerous one. Changes almost invariably take place in the mixture, and by the close of the day it becomes unfit for consumption.

When the graduated bottle is not at hand, a common glass graduate, marked for fluidrachms and ounces and holding a pint, should be provided for the nursery. Some moments before meal-time, so as to avoid hurry, the different fluid ingredients of the food are to be measured in this, one after the other; the requisite quantity of milk-sugar is then added, and the whole mixed thoroughly by stirring with a spoon and poured into the feeding-bottle. When the graduated bottle is employed, thorough shaking is sufficient. The food must now be heated to a temperature of about 95° F. This can be done by steeping the bottle in hot water, or by placing it in a water bath over an alcohol lamp or gas jet. Finally, the tip is applied and the meal is ready.

When feeding, the child must occupy a half reclining position in the nurse's lap. The bottle should be held by the nurse, at first horizontally, but gradually more and more tilted up as it is emptied, the object being to keep the neck always full and prevent the drawing in and swallowing of air. Ample time, say five, ten or fifteen minutes, according to the quantity of food, should be allowed for the meal. It is best to withdraw the bottle occasionally for a brief rest, and after the meal is over sucking upon the empty bottle must not be allowed, even for a moment.

*e.* For children residing in cities, an honest dairyman must be found, who will serve sound milk and cream from country cows once every day in winter and twice during the day in the heat of summer. The milk of ordinary stock cows is more suitable than that from Alderney or Durham breed, as the latter is too rich and therefore more difficult to digest. The mixed milk of a good herd is to be preferred to that from a single animal. It is less likely to be affected by peculiarities of feeding and less liable to variation from alterations in health or different stages of lactation.

The care of the herd and of the milk is of great consequence. The cows should be healthy, and the milk of any animal that seems indisposed should not be mixed with that from perfectly healthy animals. The cows must not be fed upon swill or the refuse of breweries, glucose factories, or any other fermented food.

They must not be allowed to drink stagnant water, and must not be heated or worried before being milked. The pasture must be free from noxious weeds and the barn and yard must be kept clean. The udders should be washed, if dirty, before the milking. The milk must be at once thoroughly cooled. This is best accomplished by placing the can in a tank of cold spring water or in ice-water, the water being of the same depth as the milk in the can. It is well to keep the water in the tank flowing; indeed this is necessary unless ice water be used. The can should remain uncovered during the cooling and the milk should be gently stirred. The temperature should be reduced to 60° F. within an hour and the can must remain in the cold water until the time for delivering.

In summer, when ready for delivery, the top should be placed in position and a cloth wet in cold water spread over the can; or refrigerator cans may be used. At no season should the milk be frozen; but at the same time no buyer should receive milk having a temperature over 65° F.

The milk and cream must be transported from the dairy in perfectly clean vessels. To insure this it is best to provide two sets of small cans, one set to be thoroughly cleansed and aired while the other is taken away by the milkman to carry back the next supply. So soon as this arrives in the morning, or in the morning and evening in hot weather, the cans should be emptied into separate and absolutely clean earthenware or glass pitchers, and these put at once into a refrigerator reserved exclusively for them. This may stand in some convenient spot near the nursery, but not in it, and especially not in an adjoining bath-room. With a good refrigerator, there is no difficulty in keeping milk perfectly sweet for twenty-four hours in winter and for twelve hours in summer, except on intensely hot days; then it may be necessary to scald or lightly boil the whole of the supply when received in order to prevent change.

It is a well known fact that milk is a fluid having active powers of absorption, and that it frequently acts as the medium of the transmission of the contagion of such diseases as scarlatina, diphtheria and typhoid fever. Dr. V. C. Vaughan<sup>6</sup> has also lately discovered in milk a special poison which he terms *tyrotoxinon* (cheese poison). Tyrotoxinon has been discovered in cheese, in

stale milk,—such as may collect in crevices of imperfectly cleaned cans,—and even in fresh milk, though probably it is never present in the latter unless the cow be diseased. The nature and symptoms of the producing disease have, however, not as yet been discovered or described.

The poison is supposed to be the product of a ferment of unknown nature. It is a crystalline body of a penetrating cheesy odor, giving Prussian blue with potassium ferricyanide and ferric chloride, and reducing iodic acid; it is not precipitated from solution by the ordinary alkaloidal reagents. If the crystals be allowed to stand at ordinary temperature, they decompose with the formation of an undetermined organic acid.

Vaughan's method of obtaining tyrotoxinon is as follows:—Allow the milk to stand for twelve hours, then filter to separate the curd and render the acid filtrate feebly alkaline by the addition of potassium hydrate. Next agitate with absolute ether, allow to settle, and after separation remove the ether with a pipette and allow to evaporate spontaneously. Finally redissolve the residue in distilled water, add ether, agitate and allow of evaporation as before. The poison is then obtained in a pure crystalline form.

A few (10) drops of an aqueous solution of these crystals placed upon the tongue of a small dog or cat produce in a few moments frothing at the mouth, retching, vomiting of a frothy liquid, spasm of the abdominal muscles, and later free watery purgation.

Of purely chemical procedures, the color-test is the best method of detection. For this purpose place on a clean, white porcelain plate two or three drops of pure sulphuric acid and the same quantity of pure carbolic acid, which should make a nearly colorless mixture; then add a few drops of a watery solution of the suspected crystal. Should tyrotoxinon be present, a color varying from yellow to orange red will appear.

The clinical element of interest in these discoveries is the close analogy between the symptoms produced by the experimental use of tyrotoxinon and those observed in cholera infantum,—an analogy suggestive of the possibility of the latter disease being chiefly due to poisoned milk. This casual relation is scarcely more than a theory, though certain well known features of the

disease seem to bear it out. Thus, the affection occurs at a season when decomposition of milk takes place most rapidly; it occurs at places where absolutely fresh milk cannot be obtained; it prevails among classes of people whose surroundings are most favorable to fermentative changes; it is most fatal at an age when there is the greatest dependence upon milk as a food, when the gastro-intestinal mucous membrane is most susceptible to irritants, and when irritation and nervous fevers are most easily produced.

Drs. Newton and Wallace,<sup>7</sup> of the New Jersey State Board of Health, report a number of cases of poisoning by milk that occurred in different hotels at Long Branch. These observers found that the affected milk was all obtained from one milkman, and that the cows furnishing it were milked at the unusual hours of midnight and noon. The noon milking was immediately placed in cans without being cooled, and "carted eight miles during the warmest part of the day in a very hot month." It was this milk that produced the poisonous effects, the morning's milk being always good. No statement is made as to the health of the cows or the nature of the poison; but there is a probability of its being tyrotoxon, and of this material or its ferment having been generated by the careless collection and transportation of the milk, combined with the high atmospheric temperature.

#### CHILDHOOD.

Children who have cut their milk teeth may be fed for a twelvemonth—namely, up to the age of three and a half years—in the following way:—

First meal, 7 A.M.—One or two tumblerfuls of milk, a saucer of thoroughly cooked oatmeal or wheaten grits, and a slice of bread and butter.

Second meal, 11 A.M. (if hungry).—A tumblerful of milk or a teacupful of beef tea with a biscuit.

Third meal, 2 P.M.—A slice of underdone roast beef or mutton or a bit of roast chicken or turkey, minced as fine as possible; a baked potato thoroughly mashed with a fork and moistened with gravy; a slice of bread and butter; a saucer of junket or rice and milk pudding.

Fourth meal, 7 P.M.—A tumblerful of milk and one or two slices of well moistened milk toast.



From three and a half years up the child must take his meals at the table with his parents, or with some reliable attendant who will see that he eats leisurely. The diet, while plain, must be varied. The following list will give an idea of the food to be selected:—

BREAKFAST.

| <i>Every day.</i>   | <i>One dish only each day.</i> |
|---------------------|--------------------------------|
| Milk,               | Fresh fish,                    |
| Porridge and cream, | Eggs, lightly boiled,          |
| Bread and butter.   | poached,                       |
|                     | scrambled,                     |
|                     | plain omelette.                |
|                     | Chicken hash,                  |
|                     | Stewed kidney,                 |
|                     | Stewed liver.                  |

Sound fruits may be allowed before or after the meal, according to taste, as oranges, grapes without pulp (seeds not to be swallowed), peaches, thoroughly ripe pears, cantaloupes and strawberries.

DINNER.

| <i>Every day.</i>             | <i>Two dishes each day.</i> |
|-------------------------------|-----------------------------|
| Clear soup,                   | Potatoes, baked,            |
| Meat, roasted or broiled, and | mashed,                     |
| cut into small pieces.        | Spinach,                    |
| Bread and butter.             | Stewed celery,              |
|                               | Cauliflower,                |
|                               | Hominy,                     |
|                               | Macaroni, plain,            |
|                               | Peas,                       |
|                               | String-beans, young,        |
|                               | Green corn, grated.         |

Junket, rice and milk or other light pudding, and occasionally ice-cream may be allowed for dessert.

SUPPER.

| <i>Every day.</i>               |
|---------------------------------|
| Milk,                           |
| Milk toast or bread and butter, |
| Stewed fruit.                   |

Fried food, highly seasoned or made-up dishes are to be excluded, no condiment but salt is to be used, and the formation of a habit of eating between meals must be avoided.

Filtered or spring water should be the only drink; tea, coffee, wine or beer being entirely forbidden.

As to the quantity, a healthy child may be permitted to satisfy his appetite at each meal, under the one condition that he eats slowly and masticates thoroughly.

In cases of illness, the diet must be reduced in quantity and quality according to the rules that are applicable to adults.

## MANAGEMENT OF WEAK AND IMMATURE INFANTS.

When premature expulsion of the fœtus cannot be checked, children are born in a condition of feebleness requiring particular care. Such children are under weight, breathe and eat imperfectly; have ill-formed organs, and badly performed functions; their skin is soft and delicate, bright red in color, and so transparent that the superficial blood-vessels can often be seen, and their cry is feeble. Their muscles are inert, they hardly seem to contract, and the movements of the limbs are rare and without vigor. The infant, plunged in a sort of torpor, has not even strength enough to suck, the muscles of the cheeks and of the tongue and palate being apparently too weak to perform this act, and deglutition itself is often slow,—a grave symptom, since the regular accomplishment of this function alone renders life possible.

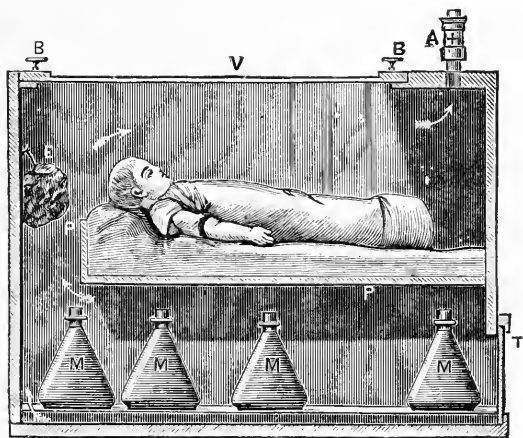
The employment of artificial heat and a well regulated alimentation are the methods of combating this condition. Warmth and even temperature of the surrounding air are most important. The old method of accomplishing this was to envelop the infant's body and limbs, under the ordinary clothing, with a layer of cotton wadding, and place a fold of the same around the head. Two or three bottles filled with hot water were placed under the blankets of the bed, and renewed from time to time as they became cold. An effort was made to maintain the temperature of the chamber at 77° Fahr. All changes of clothing were made before a brisk fire, and two or three times every day massage or friction, either dry or with various stimulating embrocations, was practiced to strengthen the circulation. As an improvement upon this crude and very unsuccessful method, M. Tarnier has devised an apparatus called a "hatching-cradle."

It consists of a box made of wood, sixty-five centimetres long by fifty high and thirty-six wide, with sides twenty-five millimetres thick. The inside of the box is divided by a partial partition into two parts; this partition, which is horizontal, is placed about fifteen centimetres from the bottom. The lower story is intended for hot-water bottles.

The cut opposite shows the apparatus:—

There are two doors: one is a sliding door on the side of the box to push to either side for the purpose of introducing the hot-

water bottles; the other is at one of the ends (at T in this figure); it does not completely close the orifice, but allows air to enter. The upper part, for the baby, contains the bedding, and is covered with a glass top at V; it should close tightly and be held by two screws at B.B. At A is an outlet for the air, to which a small ventilator can be attached. In the opening between the two chambers a wet sponge is placed to keep the air slightly moist, and here also a thermometer is placed to mark the temperature. The heat is supplied by earthenware jugs at M; they contain a pint of water each; four or five are required to keep the temperature at the proper point,—87–90° Fahr. The chamber must be heated to this degree before the infant can be placed in it, and every one



and a half or two hours one of the water bottles must be changed in order to maintain a constant temperature. The air passes in by the door T, is heated by the bottles, and passing by the sponge, E. escapes at A; the movements of the small ventilator in the latter position is the index that the air is circulating. The infant must be dressed in swaddling clothes, as it has been observed that the temperature is always two or three degrees higher under the clothing than in the chamber itself. Every hour or two, according to the case, the little patient should be taken out to receive food and have its napkins changed. The shorter time occupied in these processes the better.

The excellent results obtained by these cradles is shown by the following statistics obtained from the Maternité in Paris:—

| WEIGHT OF CHILD.   | NO. OF INFANTS. | NO. THAT LIVED. | NO. THAT DIED.     |
|--------------------|-----------------|-----------------|--------------------|
| 1000-1500 grammes. | 40              | 12              | 28 or 70 per cent. |
| 1501-2000    “     | 131             | 96              | 35 or 26.7   “     |
| 2001-25000   “     | 112             | 101             | 11 or 9.8   “      |

Before the introduction of the machine, infants died at the rate of 66 per cent. ; since, the average proportion is 36.6 per cent.

The heated cradle has also been used with success in the treatment of sclerema, œdema and cyanosis, attacking the newly born.

From the very first day an attempt must be made to put these feeble infants to the breast; and if they be too weak to suck, the milk may be squeezed into the mouth or first into a warm spoon and then given to the child. The mother's or nurse's milk, without dilution or addition, is the best food, though if this cannot be obtained, asses' milk may be used. This must be mixed with equal quantities of warmed sugar and water—3 parts to 100. When the cow's milk is employed, the mixture should be one part to three of the same sugared water. M. Tarnier recommends the cow's milk to be prepared thus: The mixture of milk and sweetened water is placed in an air-tight pot, and this is placed in boiling water for half an hour. It is given to the child from a small spoon. When the infant is very small, six to eight grammes (f5ij) are enough for a meal; larger babies require from ten to fifteen grammes (5iiss-3iiss). There should be at least twelve meals every twenty-four hours.

It often happens that the babe will drink badly and throw up half the liquid given. Under this deficient feeding the little sufferer gets rapidly worse, loses weight, and frequently has diarrhœa. In these cases “gavage” is resorted to. The apparatus used is quite simple, being nothing more than a urethral catheter of red rubber (Nos. 14-16 French), at the open end of which a small glass funnel is adjusted. The infant upon whom gavage is to be practiced is placed on the knee with its head slightly raised; the catheter being wetted is introduced as far as the base of the tongue, whence, by the instinctive efforts at deglutition, it is carried as far down as the œsophagus and into the stomach. The liquid food is

next poured into the funnel, and by its weight soon finds its way into the stomach. After a few seconds the catheter must be removed, and here is the great point in the operation: *it must be removed with a rapid motion and at once*, for if it be withdrawn slowly all the food introduced will be vomited.

The number and quantity of the meals thus given must vary with the age and strength of the infant. As a rule, eight grammes (3ij) of food every hour will suffice when the subject is small, but there must be an increase as circumstances require. Mother's milk is the best in gavage, but other foods may be used if it be impossible to obtain it.

Should the gavage be too copious, the infant gains rapidly in weight and size. This increase, however, is due to œdema, and quickly disappears when a proper quantity of food is administered. When excessive feeding is continued, indigestion soon sets in and the patient dies of gastritis or enteritis. As soon as the child gains strength this mode of feeding may be alternated with nursing, and gradually breast feeding may be entirely substituted for it. Nevertheless, the least digestive disturbance indicates the necessity of a return to gavage.

Even when the child is old enough to nurse, should it be weak, it is useful, outside of its regularly taking the breast, to resort to gavage three or four times a day. This is what M. Tarnier calls *gavage de renfort*, as it keeps up the strength of the infant so that it can take the breast and digest well.

The absence of the sensation of hunger and of the necessary strength to suck are not contra-indications to this mode of feeding; and by it, together with the use of hatching machines, the actual period of vitality has approached the legal period, which in French law is six months of intra-uterine life.

#### HYGIENE OF INFANCY AND CHILDHOOD.

*Bathing.*—During the first two and a half years of life, a child should be bathed once every day. The bath should be given at a regular time, and it is best to select some hour in the early morning, midway between two meals, ten o'clock, for instance. The tub should be placed near the fire or in a warm room in winter, and away from currents of air in summer. It should contain enough water to cover the child up to the neck when in a

sitting posture, and the temperature must be about 95° F. Upon undressing the child, the first step is to wet the head; then he is to be plunged into the water and thoroughly washed with a soft rag or sponge, and pure, unscented castile soap. After remaining in the water from three to five minutes, the surface must be well dried and rubbed with a flannel cloth or soft towel; then the body must be enveloped in a light blanket and the infant either returned to his crib to sleep, or kept in the lap for ten or fifteen minutes, until thoroughly warm and rested and finally dressed. If there be repugnance to the bath, the tub may be covered with a blanket and the child being placed upon it may be slowly lowered into the water without seeing anything to excite his fears.

In very hot weather, in addition to the morning full bath, the body may be sponged twice daily with water at a temperature of 90° F.; this, contrary to what might be expected, has a greater and more permanent cooling effect than bathing with cold water.

After the third year, three baths a week are quite sufficient. An evening hour is now to be preferred, but the water must still be heated to 90°.

About the tenth year cooler baths can be begun, from 72° to 75° being the proper temperature. The cold sponge or cold plunge is not admissible as a daily routine until youth is well advanced.

The hot bath, 95° to 120°, is employed for various purposes, notably for derivative action, to cause a diaphoresis, to relieve nervous irritability, and to promote sleep. Whether a full bath or merely a foot bath be required, five minutes is sufficient time for immersion; then, with or without drying, according to the degree of sweating desirable, the whole body, or only the feet and legs in case of a foot bath, must be enveloped in a blanket and the child put to bed. To render these baths more stimulating, from a teaspoonful to a tablespoonful of mustard flour may be added, and the child held in the water until the arms of the nurse begin to tingle.

It is important not to continue a hot bath too long, lest the primary stimulating effect be followed by depression; but this is temporary, and is followed by reaction, during which the skin grows red and the pulse becomes fuller and stronger. They have therefore a general stimulant and tonic action, promoting nutrition

and giving tone to the body. On account of the shock, the extent of which depends directly upon the coldness of the water, these baths must be used with caution, and are not to be employed in very young or feeble subjects.

When giving a cold bath the child must be stripped in a warm room, and thoroughly rubbed with the palm of the hand until the whole body, especially the spinal region, is warm; he must then stand in a tub containing enough hot water to cover the feet, and be rapidly sponged with the cold water. The temperature of the latter must never be below  $60^{\circ}$ , and the addition of half an ounce of sea-salt or a tablespoonful of concentrated sea-water to the gallon, renders it more stimulating and insures a complete reaction. After sponging, the surface must be thoroughly and quickly dried with a soft towel and shampooed with the open hand until aglow.

The cooled bath may be employed with advantage in extreme conditions of hyperpyrexia; the child to be first immersed in water at  $95^{\circ}$ , this being gradually lowered to  $70^{\circ}$  by the addition of cold water, the process occupying from fifteen to thirty minutes.

#### CLOTHING.

Infants and young children have little power of resisting cold, and on this account require warm clothing. Too much cannot be said in condemnation of the fashion of allowing children to go, even while in the house, with bare legs and knees.

Every child is supplied with a certain amount of nerve force to be daily expended in the maintenance of the different functions of the body,—respiration, circulation, digestion, calorification, etc. If an excessive proportion of this force be consumed in keeping up the heat of the body, as is the case when so much is left bare, the other functions, especially the digestive, must suffer in consequence.

During the oppressive heat of summer the legs may be left uncovered; but throughout the rest of the year, the whole body must be encased in woollen underclothing. The thickness of this must vary, of course, with the season. Drawers, especially adapted for children wearing diapers, can be obtained of the Dress Reform Association. These are made in two pieces that they may not become wet or soiled. The outer clothing may be left to the taste

of the mother; but all garments should fit loosely, that the functions of the different viscera may not be impeded by pressure.

The best pattern of a winter night-dress is a long, plain slip, with a drawing-string at the bottom to prevent exposure of the feet and limbs, should the child kick off the bed-covering. This should be made of flannel, or the more easily washed Canton flannel. In summer a loose muslin one may be used without the drawing-string. A flannel undervest should always be worn at night, light gauze in summer and heavier wool in winter; care must be taken, however, to have one for night alone, discarding that worn in the daytime.

In infants under a year old, a broad flannel abdominal bandage, extending from the hips well up to the thorax, or better still, a knitted worsted band shaped to fit the form, is very useful in keeping the abdominal organs warm, aiding digestion and preventing pain.

All clothing should be changed frequently enough to insure perfect cleanliness.

Shoes must be large, well shaped, and made of soft leather, with pliable soles, so as to allow the feet to grow freely.

When dressing a child for exercise in the open air in cold weather, the outer clothing must not be put on until just before leaving the house and removed immediately on return.

It is important to protect the head in winter by a close fitting thick cap, and from the direct rays of the sun in summer by a broad brimmed light straw hat.

Rubber shoes are necessary in wet weather to keep the feet warm and dry while walking out of doors.

#### SLEEP.

For some time after birth, infants spend the intervals between being fed, washed and dressed, in sleep, and thus pass fully eighteen out of the twenty-four hours. As age advances, the amount of sleep required becomes less, until at two years thirteen hours, and at three years eleven hours are enough. Any marked diminution in the length of sleep or decided restlessness indicates disease and demands attention from the physician. This matter, though, is perhaps more a question of training than any other item of nursery regimen, and many a mother, by want of judicious



firmness, has rendered the early years of her child's life not only a burden to herself, but an annoyance to the entire household.

One cannot begin too soon to form the good habit of regularity in sleeping hours; and so far as circumstances will admit, the following rules may be enforced:—

From birth to the end of the sixth or eighth month, the infant must sleep from 11 P.M. to 5 A.M., and as many hours during the day as nature demands and the exigencies of feeding, washing and dressing will permit.

From eight months to the end of two and a half years, a morning nap should be taken from 12 M. to 1.30 or 2 P.M., the child being undressed and put to bed. The night's rest must begin at 7 P.M. If a late meal be required, the child can be taken up about ten o'clock; but if past the age for this, he may sleep undisturbed until he awakes, of his own accord, some time between 6 and 8 A.M.

From two and a half to four years, an hour's sleep may or may not be taken in the morning, according to the disposition of the subject.

After the fourth year few children will sleep in the daytime; they are ready for bed by 8 P.M., and should be allowed to sleep for ten hours or more.

A later retiring hour than 9 P.M. ought not to be encouraged until after the twelfth or fifteenth year.

When feasible, different rooms should be used for the day nursery and the sleeping apartment. The latter should be large, airy, well ventilated, so situated as to be exposed for a certain period each day to the direct rays of the sun, and provided with an open fire-place—for wood, preferably—which serves for both heating and ventilating. It should contain a bed for the nurse and a crib for the child, and be without curtains, heavy hangings or superfluous furniture. A stationary washstand draining into a sewer is not to be permitted, neither should the room communicate with the bath-room. Soiled diapers or chamber utensils are to be removed at once, no matter what the time of night. The day nursery should have large windows, protected by blinds, and a southwestern exposure; all other requisites, with the exception of beds, are the same as in the sleeping room. It is very convenient to have the two chambers adjoining, but capable of entire

separation by a door, so that one may be thoroughly aired without chilling the other. This arrangement, too, renders it practicable, by standing the door open and raising the windows in the day nursery, to keep the dormitory cool in hot weather without exposing the child to currents of air.

If an apartment has to be occupied during both the day and night, it must be vacated for a half an hour or more in the evening and well aired before the child is put back to bed.

The temperature of the rooms must be as uniform as possible the proper degree of heat being from 68° to 70° F.

The crib should have high sides, to prevent the child from falling out and injuring himself, and should be provided with springs and soft hair mattress, protected by a gum cloth, placed under a double sheet. The bed-clothes must be light in weight, while varying in warmth according to the weather. It is just as important to insist upon cleanliness here as in the clothing of the body.

#### EXERCISE.

A certain amount of muscular exercise is necessary for the development and for the proper performance of the digestive functions. Infants before they are able to stand will use their muscles sufficiently if when loosely clad they are placed upon their backs in a bed and allowed to kick and turn about at pleasure. After the age of nine or ten months a healthy child will begin to creep ; at the end of a year he will make an effort at standing, and from four to eight months later will be able to walk by himself. Children, however, present great differences in this respect, and a delay of a few months must not be considered abnormal. As soon as efforts at creeping are made there need be no fear that insufficient exercise will be taken ; the care should be rather to prevent over-fatigue.

Fresh air and sunlight are as necessary as muscular exercise. The child must be taken out of doors every day, weather permitting, after arriving at the proper age ; this is four months for children born in the early fall and winter and one month for those born in summer.

In cool weather, babies who are unable to walk should be taken out in a coach, or in the nurse's arms, for an hour in the morning and a half an hour in the afternoon while the sun is

shining. In summer they may pass the greater part of the waking hours in the open air, provided they be well protected from the direct rays of the sun.

Children old enough to walk may spend a longer time in the air in winter, and may be out all day in summer. But until the fourth year it is better to let them play about at will than to take a long set walk.

Until well advanced in childhood the house is the safest place in damp and rainy weather, when there is a strong east or north wind blowing and when the thermometer stands below 15°.

#### REFERENCES.

1. Revue de Thérapeutique. 2. Brit. Med. Jour. 3. Parvin, Science and Art of Obstetrics. 4. See Leeds' Analysis, Trans. Coll. of Phys., Phila., Vol. 1. 5. Arch. of Pediatrics. 6. Jour. of Reconstructives. 7. Med. News, 1886.

Undated references apply to journals published in 1887, and original articles can be found by consulting the indexes of the respective publications.

# DISEASES OF INFANCY AND CHILDHOOD.

By J. LEWIS SMITH, M.D.,

AND

A. F. CURRIER, M.D., F. M. WARNER, M.D., T. H. MYERS, M.D.,

B. G. COOKE, M.D., F. H. DANIELS, A.M., M.D.,

E. C. WENDT, M.D., S. BARUCH, M.D.,

D. BROWN, M.D.

NEW YORK.

---

## THE BLOOD OF THE NEWBORN.

A KNOWLEDGE of certain conditions respecting the blood in the newborn will certainly be of assistance in the management of diseases which depend to a great extent upon the character of that vital fluid. The recent contributions to this subject have been very important. Among them may be mentioned particularly the work of Silbermann,<sup>75</sup> who thinks the incomplete knowledge of diseases of the blood in newborn infants is due to the fact that its physiology has not been sufficiently investigated. Hofmeier, in connection with his work on icterus in the newborn, has given the results of careful investigations which show that the destruction of albumin in that disease has an influence upon the albumin which circulates in the blood plasma, and that this, added to the quick respiration which occurs immediately after birth, leads to a great consumption of red corpuscles. With reference to the morphology of the blood in the newborn, Hofmeier discovered (1) that the size of the red corpuscles varied within wide limits; (2) that they were more spherical than those of adults; (3) that they evidenced no tendency to form *rouleaux*; (4) that the white corpuscles are often more abundant than in adults; (5) that the white corpuscles tend to accumulate, in *rouleaux*; (6) that they are viscid, deliquescent, and easily destroyed. Silbermann's investigations confirmed those of Hofmeier, showing in addition that the blood of the newborn contains shadows,—that is, certain delicate pale rings constituting the stroma of the red corpuscles, the coloring matter having

been removed. These bodies were first discovered by Ponfick, and were found to be the more abundant the more the child's general condition was disturbed during the first few days of life. When considering the significance of these bodies, it is to be remembered that two questions of nearly equal importance have interested students of hæmatophysiology and hæmatopathology for the past ten years, viz., the significance of hæmoglobin with reference to general tissue changes, and the effect of the coloring matter of the blood upon the organism after its release from the stroma and its transfer into the plasma.

With reference to the latter, it is known that it is dissolved in the blood with subsequent hæmoglobinuria by the influence of certain substances such as glycerine, pyrogallie acid, etc., and after burns, severe physical exertion, syphilis, colds, etc. Thus the so-called shadows arise; and hence it is established that the coloring matter of the blood is withdrawn from the red corpuscles and their stroma is transformed into these delicate pale rings (shadows). Hæmoglobinuria is not inevitable in presence of these bodies; but if it occurs, then, according to Schmidt, the circulating blood will contain a relatively large quantity of fibrine ferment, red and white corpuscles having contributed it as a result of their destruction. Silbermann also experimented upon frogs and dogs by introducing hæmoglobin into the circulation. Deviations from the normal after such experiments corresponded to the conditions found in the blood, urine, and liver of infants during the first few days of life. Hence it was concluded that in this period a great destructions of red corpuscles resulted in liberating small quantities of free hæmoglobin. This was necessarily followed by hæmoglobinaemia, and an increase of the fibrine ferment in the blood. These new conditions were most noticeable in the venous circulation, venous stasis and hyperæmia furnishing the evidence to that effect. Thus it appears that the condition of the blood in the newly born predisposes to disease; and if such conditions as asphyxia, omphalitis, syphilis, gastric and intestinal catarrh, and erysipelas exist, they are likely to be of grave significance. If disease should not be present the liver would, in a few days, convert the hæmoglobin liberated from the destroyed red corpuscles into biliary coloring matter which would be partly eliminated with the fæces and urine. Silbermann's conclusions are the following: (1) The blood of the newly born

contains corpuscles which vary greatly in size, and also the so-called shadows. (2) It is richer in fibrine ferment than the blood of adults. (3) These peculiarities are due to the liberation of hæmoglobin and its transfer into the plasma. (4) The richness in fibrine ferment of the newly born predisposes to disease. (5) All disease processes in the newly born which involve great destruction of the albumin in the circulation are especially dangerous to life.

The statements of Keating and Edwards<sup>74</sup> on "the character of the blood of a newborn child," based especially upon the work of Hayem and Osler, do not altogether agree with the foregoing. They consider that the coloring matter in the child's blood is about the same as in the adult's, and that at the moment of birth the same variety of white cells exists as in the adult. They also believe that the number of red cells immediately after birth is influenced by the plan which is adopted in tying the cord, the number being much greater when the ligation is deferred until all pulsation has ceased. During the period immediately after birth which corresponds to diminution in the weight of the child, the number of red and white cells remains stationary or gradually increases until the minimum weight is reached, which is usually in three days. The specific gravity of the blood is greatest at birth, being then 1066. It is least between the ages of ten weeks and two years, being 1048 in boys and 1050 in girls.

#### PREMATURELY BORN INFANTS.

Among the considerations which affect prematurely born infants, that of regulation of the temperature is a very important one, and has furnished a theme for a series of investigations by Eröss.<sup>68</sup> This observer found that the temperature of such infants is not always subnormal, as is commonly supposed. Of 50 cases which were seen by him the temperature was either normal or febrile in three-fourths of them, and hence artificial heat was not indicated. He also found that the temperature did not depend either upon the time when the birth occurred or upon the weight of the body, and that frequent thermometric observations were necessary to prevent errors in supplying artificial heat. There were great differences in the thermometric oscillations during the first eight days of life between infants who were born at term and those

who were premature. With the former a double lowering of the temperature followed by an elevation of the same extent was observed every few days: with the latter this occurred only exceptionally. In premature children a perceptible chilliness of the surface, followed by a gradual rise of temperature, was observed, the same as in those who were born at term. In the former, however, the chilliness was more decided and of longer duration; and the subsequent rise of temperature occurred more slowly, without reaching so high a point as in mature infants. In cases in which there was a second elevation and depression of temperature in the premature, it usually occurred at the end of the second day or at the beginning of the third, the depression occurring for a moment, and either a normal condition or a further depression following. It was observed that premature children were seriously affected by changes in the atmosphere which had no perceptible effect upon the mature. Hence the external temperature should be kept quite warm; and even for premature infants a slight elevation in the body temperature of the premature does not necessarily indicate a considerable loss of heat, but rather less heat producing power. The principal aim should not be, therefore, to check loss of heat by wrapping an infant in thick layers of cotton, but rather to furnish means for the internal production of a greater supply.

#### DISEASES OF THE HEART IN THE NEWBORN.

Both the lining and the covering membranes of the heart in the newly born are susceptible to disease from causes other than congenital. Keating and Edwards<sup>74</sup> have been followed freely in their investigations in this direction. Billard has stated that pericarditis was more frequently seen in the fœtus and newborn infants than in individuals at any other period of life. This statement is now believed to be incorrect. Keating and Edwards found it in an infant 36 hours after birth. Tardieu has observed the disease, and also that the pathological changes are about the same as in the adult. He is unable to make definite statements in regard to its etiology, though reports are current that it is associated with puerperal disease in the mother, and also with early vaccination. According to Weber, pyæmic pericarditis may follow inflammation of the umbilical cord. He also states that chronic

pericarditis is much more common than acute in children who die a few days after birth, and that it is frequently associated with pleurisy. Kirkenstein differentiates two forms of pericarditis in the newborn,—the circumscribed and the diffuse. Pericarditis may be accompanied with effusion, as in adults, the pericardial sac containing from 8–20 grams of fluid, which may be either serous or purulent. According to Blache, the effusion may be purulent if it is poured out at birth; if it is a non-fibrinous yellow serum, it was poured out during foetal life, and is due to disease of the mother. The difficulties in diagnosing this disease are usually insuperable. It is believed that it is usually fatal.

With regard to endocarditis, Rauchfuss reports that he has seen more than 200 cases in the foetus, the right heart being diseased in by far the larger number of them. This fact is explained by the relatively greater pressure on the valves of the pulmonary artery. The lesion in these cases is usually a soft red pedunculated vegetation at or near the tricuspid valve, less often at the mitral valve, and rarely either on the aorta or the pulmonary artery. Blache has reported two cases of foetal endocarditis which he saw in twins who died just after birth. In both there were soft red globular vegetations at the mitral valve. In most of the cases the vegetations proliferate from a connective tissue base, and if the child does not die at birth organic changes are caused which give rise to cyanosis. This latter condition constitutes the most characteristic symptom in making a diagnosis of endocarditis. The entire body may have a bluish tinge, the extremities being cold, and dyspnoea also being present. A systolic bruit may also be heard in the direction of the circulation, and over the entire præcordia there may be extreme palpitation and tumultuous cardiac action. Death will usually occur within a few days after birth.

#### DISEASES OF THE LIVER IN THE NEWBORN.

Syphilitic hepatitis was first described by Gubler, in 1852, and comparatively few cases have been recorded. Ollivier and Ranvier have published 3 cases of this character; Gubler, 1; Dépaül, 1; Prévost, 1; and Dépasse,<sup>76</sup> 1. All of these, with the exception of the last, terminated fatally. According to Gubler, icterus is not to be expected as a symptom, and Dépasse endorses this assertion. Both parents in Dépasse's case were syphilitic when



the child was born, and ascites was subsequently a prominent symptom with the child. Mercurial treatment resulted in a cure which seemed to be complete.

Silbermann<sup>7</sup> reached the following conclusions concerning icterus in the newly born: (1) Icterus neonatorum is an icterus of resorption, and therefore hæmatogenous in character. (2) The biliary engorgement is located in the biliary capillaries and interlobular bile-ducts, which are compressed by the dilated branches of the portal vein and the capillary blood-vessels of the liver. (3) This engorgement in the vessels is effected by a change in the circulation of the liver which occurs soon after birth, and is one of the indications of a general change in the blood-plasma. (4) This change, which is induced by the destruction of many blood corpuscles soon after birth, consists of a kind of blood-fermentation. (5) The more feeble the infant the more intense will be the icterus; for in such a child the destruction of corpuscles and the consequent blood changes will be much more decided than in a vigorous child. (6) As a consequence of the destruction of so many red corpuscles there is abundant material for the formation of biliary coloring matter, and under the influence of the fermentation process alluded to, this accumulates for a long time and in considerable quantity in the hepatic vessels.

#### DISEASES OF THE NERVOUS SYSTEM IN THE NEWBORN.

In a paper upon the pathology of infantile convulsions, Hughlings-Jackson<sup>77</sup> advances the theory that the central nervous system contains groups of sensori-motor centres grouped in three tiers, all the parts of the body being represented in each tier, and the combinations between centres tending to become more and more complex. In infancy the upper and middle layers are not developed; and the lowest, though developing rapidly, is in a state of unstable equilibrium and liable to respond unduly to exaggerated physiological stimuli. Imperfect respiration is considered to be an efficient cause of convulsions,—undue quantity of venous blood in the respiratory centre producing a stimulus which excites asphyxial convulsions because it is imperfectly resisted.

Cheadle,<sup>35</sup> in discussing the pathology and treatment of tetany, laryngismus and convulsions, considers all these affections as closely associated and all dependent upon rachitis. He has found

rachitis present in every case of tetany which he has seen. Abercrombie observed the same association in 14 cases of tetany which he has reported, laryngismus being present in all of them. Gee found laryngismus associated with rachitis in 48 cases out of 50 of the former disease. It must be remembered in connection with these facts that rachitis is not a disease of the bones merely, but one which is due to defective nutrition of muscle and nerve as well. It may have been caused by a diet (on the part of the mother during the period of gestation) which was deficient in animal albuminates and animal fats, while starches and sugars were in excess,—result being a hyperexcitability of motor nerve cells from defective nutrition. In these cases Cheadle finds no change in the cerebrum, but a non-organic one in the ganglia of the cord. The indications for treatment are the following: (1) to relieve dangerous convulsive seizures when they occur; (2) to prevent recurrence of attacks; (3) to remove constitutional rachitic state upon which they depend.

For the first indication, in laryngismus, cold water may be dashed upon the face, a hot sponge may be applied to the larynx, or vomiting may be induced by thrusting the finger down the child's throat. If the convulsions are general, chloroform may be inhaled or small quantities of chloral or bromide of potash injected *per rectum*. To prevent recurrence of the attacks, minute doses of bromide and chloral may be given continuously for several weeks, the system being constantly kept under their influence. The doses may be gradually increased should the symptoms require it. The influence of a suitable diet, on the one hand, and a faulty condition of the alimentary canal, on the other, upon this condition, must not be forgotten.

#### SYPHILITIC PSEUDO-PARALYSIS OF THE NEWBORN.

This condition, which was first correctly described by Parrot in 1872, has been successfully treated in three cases by Laffitte,<sup>68</sup> and these form the basis of a very instructive article. In newborn infants who are the subjects of it, there is an apparent paralysis of the limbs, caused by changes in the bones. This condition was observed by Valleire, Guéniot, Bednar and Henoeh; but they erroneously supposed it to be true paralysis, attributing it to a specific inflammation of the nervous centres, and not suspecting

that lesions of the bones were its sole cause. Wegner's investigations concerning the pathological anatomy of this condition were published about the same time as Parrot's memoir; but he overlooked certain common forms of the disease, evidently writing from an anatomical rather than a clinical standpoint. The lesions appertain chiefly to the epiphyseal extremity of the long bones, and cause a separation of the epiphyseal cartilage from the bone, the separation occurring upon the bony epiphysis near the line of union of cartilage and bone. The rubbing of the fragments against each other causes irritation and suppuration, and the process may extend to the periosteum and the periarticular muscles. The cavity of the joint is seldom penetrated. Should the muscles remain uninvolved as well as the joints and nervous centres, the breaking of the bony levers and the great pain which is caused by motion are, according to Parrot, the only causes for the complete impotence of the limbs which characterizes this pseudo-paralysis.

This condition may exist though the periosteum may be intact, and may hold the fragments of the epiphysis in correct apposition. There is no disturbance of sensibility, the muscles remain flaccid, and do not lose their electric contractility. The two upper limbs are most frequently involved, the hands being pronated and the fingers semiflexed. Should the lower limbs be attacked, they would seem to be dislocated on grasping the child under the axillæ and raising it. Should the affected part be pinched, severe pain would be experienced, and the entire body would be agitated with the exception of the limb which was grasped, this remaining nearly or quite immovable. Palpation of the affected part will reveal swelling of the joint, and sometimes slight bony crepitation may be detected. Both limbs are usually involved, either at same time or in succession. There is no fever, and eventually the other set of extremities may be attacked. Hemiplegia and other mixed forms of paralysis rarely occur. The muscles of the face, neck and back are never involved. In many cases there are evidences of syphilis upon the skin, the lips, in the mouth, and around the anus. Upon the head there may be occipital and parietal alopecia. Death not infrequently occurs between the fourth and twenty-fifth days from athrepsia. Recovery may occur, in five weeks to two months; but all the cases which were seen by

Parrot terminated fatally. The prognosis depends much upon the general condition of the patient, a child who is well nourished and well cared for having the best chances for recovery. In making the diagnosis there are either cutaneous and mucous evidences of syphilis or there is an absence of them. In the former case the paralysis is always to be considered syphilitic and not of cerebro-spinal origin. The absence of contractures, the complete development of the paralyzed or apparently paralyzed muscles, the integrity of the muscles of the trunk, neck, and face all demonstrate this fact, and so do the epiphyseal swelling and the progress of the disease. If there is no external syphilide, the diagnosis is more difficult, and one must consider a surgical and a paralytic variety: surgical if there is any evidence of injury or arthritis, the condition being limited to the member first involved; and paralytic when there is no evidence of traumatism, and the paralysis extends to another or to other members. In differentiating from atrophic paralysis it is to be remembered that this occurs at a later period of childhood than the syphilitic variety. It begins with fever and does not extend beyond the muscles which are first involved; nor is it accompanied with pain and epiphyseal swelling. The muscles do not respond to electricity after the first week, nor subsequently at all in those which become atrophied. The treatment which is recommended by Laffitte, and which was used successfully in his three cases, is Van Swieten's solution or Gibert's solution (French codex) and sublimate baths. The child should be nourished at the breast, and should have pure air and good hygiene in general.

#### INFLUENCE ON THE NEWBORN OF DRUGS ADMINISTERED TO THE MOTHER.

The influence of various drugs taken by the mother upon infants has been considered by Fehling.<sup>32</sup> If salicylate of sodium be taken by the nurse in doses of one to three grams it may be recovered from the urine of the child. The same is true of iodide of potassium. Ferrocyanide of potash given to the mother in doses of one or two grams of three doses, was not recovered from the infant's urine. If iodoform is applied to the nurse externally it may be recovered three or four days later from the urine of the child as iodine. In none of the cases in which the experiments were tried did harm result to the infant. Elimination of the mercury with the milk rarely occurs. If citric acid in a 1-90

solution be given for four days, the quantity of the solution not exceeding three grams, and if as much as seven and a half grams of hydrochloric acid solution, 5 : 180, be administered to a nursing woman in course of four days the milk will undergo no perceptible change and the child will not be harmed. Acid foods need not be withheld from nursing women from fear that the acidity will affect their milk unfavorably. Tincture of opium given to nursing women in doses of 25 drops resulted in neither drowsiness nor constipation on the part of the infants. Morphine given hypodermically in doses of 2 to 8 milligrams seldom harmed the infant; but bad effects were produced by chloral, especially if the hypodermic injections were given a short time before the child was placed at the breast. Atropine in doses of 1 to 5 milligrams was not followed by dilatation of the infant's pupils. If a mother has erysipelas or scarlatina she should not nurse her infant; but fever, *per se*, is not a contra-indication to suckling a baby.

#### SEPTICÆMIA AND PYÆMIA IN THE NEWBORN.

Miller,<sup>79</sup> in his experience at the Foundling Asylum at Moscow found that newborn infants were very susceptible to septicæmia and pyæmia, 700 to 800 deaths occurring yearly from pyæmia. These cases were divided into three groups:—

- (1) Those in which the disease occurs during the first three days of life, in which the navel-string stump is still unchanged, or only slightly changed, and in which infection must have occurred during foetal life. Autopsies in such cases revealed only *dissolution of the blood* without noticeable disease of the organs.
- (2) Those in which pyæmia set in on the fourth or fifth day coincidentally with the fall of the navel-string stump. Autopsies showed accumulations of pus, with fatty degeneration of the organs, inflammation of the peritoneum and pleuræ, and ulcerative endocarditis. In these cases infection took place at the navel.
- (3) Those in which pyæmia occurs at a later period than the others, in which the cause must be sought in unfavorable surroundings. The disease may be a complication of different inflammatory processes. Autopsies showed that the navel was healthy, the only perceptible lesions being stomatitis, or intertrigo, and rhagades about the anus in consequence of diarrhœa. In children who suffer with blennorrhœa neonatorum, an inflammatory

condition of the navel may not infrequently be found. Runge's method of treating the stump of the navel-string is recommended, and consists in drying it, sprinkling it with boracic acid, and wrapping it in salicylated cotton. Should there be suppuration, applications of carbolic acid solution and iodoform may be made. Should stomatitis or rhagades at the anus develop, they should be carefully treated on antiseptic principles. (A. F. C.)

#### DISEASES OF THE RESPIRATORY ORGANS.

##### DIPHTHERIA.

*Etiology and Pathology.*—Of the recent scientists who have been most successful in elucidating the nature of diphtheria, Loeffler should especially be mentioned. His opinions, arrived at after many microscopic examinations and experiments, have been largely accepted by collaborators in this branch of study. Therefore a brief summary of them appears to be proper in this connection. Loeffler, in the published account of his investigations, remarks that all observers have found bacteria in the diphtheritic exudate, micrococci most frequently existing in colonies, and especially abundant in superficial portions of the pseudo-membrane. At times bacteria have been found in the lymphatics in the vicinity of the inflamed part. Every diphtheritic patch contains many species of bacteria which have been cultivated; but as they have not been isolated, the specific germ of diphtheria has not been determined. The micrococci present, he says, appear to be identical with those observed in other forms of disease affecting the mucous surface, and are therefore probably not the specific germ of diphtheria. Another microbe observed by Loeffler, and described by Klebs, in 1883, merits special attention. It is a bacillus, motionless, partly straight, partly curved, of the length of the tubercle bacillus, but double its thickness. This bacillus is abundant in the pseudo-membrane, but is not found in the blood-vessels, lymphatics or internal organs, so that its pathogenic action must be localized on the surface. If it be the specific principle it must act by producing a poison where it is lodged, which poison causes necrosis, dilatation of the vessels, from which lymph exudes, and entering the lymphatics and circulatory system, causes systemic infection. But in some typical cases of diphtheria, Loeffler was unable to find the bacillus,—a fact which of course militates against the theory that

this microbe is the specific principle ; but he suggests that it might have died and been eliminated before the death of the patients. The bacilli were found in the exudate in thirteen cases of diphtheria ; and cultures to the twenty-fifth generation inoculated in guinea-pigs and birds caused a whitish exudation at the point of inoculation.

W. Watson Cheyne<sup>1</sup> recognizes the importance of Loeffler's researches, and thinks it probable that the micro-organism which causes diphtheria is a bacillus, which, lodging upon the surface of the throat, is propagated there. Having upon the mucous surface a favorable nidus for its development it not only lies upon, but penetrates the superficial portion of the mucous layer and causes the exudation of fibrinous material. The pseudo-membrane thus produced consists, according to Cheyne, of the fibrinous exudate and dead epithelial cells. As the bacilli multiply and extend, the exudate enlarges. Cheyne believes it probable, from the nature of the cause, though demonstration is lacking, that the bacilli produce very poisonous ptomaines, which, entering the circulation, give rise to general systemic infection.

That the bacillus is the causative agent of diphtheria is rendered probable, and that systemic infection by the diphtheritic poison is not produced directly by the entrance of the microbe into the circulation, but by ptomaines which have sprung into existence through the agency of the microbe, is also the opinion of some of the highest authorities in the study of bacteria.

It is seen that the investigations of Cheyne, like those of Loeffler, Wood and Formad (those of the latter two writers made in 1882), lend support to the theory that diphtheria is primarily a local malady, and that in certain mild cases it never becomes constitutional, or is constitutional in a very feeble degree. Nevertheless, those who believe that diphtheria is primarily constitutional, base their opinion on facts that lend strong support to their theory, such as the incubative period of six or seven days in certain cases, the early occurrence of nephritis, even in twenty-four hours in malignant cases, very severe and fatal nephritis and systemic infection in certain cases when the disease of the mucous surface had been so trivial as to be scarcely appreciable. The mooted subject, therefore, whether diphtheria is primarily local, or is primarily constitutional with local manifestations, or whether its nature in this respect varies in

different instances, must be considered as still undetermined. But the common clinical observation that the pseudo-membrane forms in a diphtheritic patient upon any part of the cutaneous or mucous surface, where there is a breach in its integrity, as by a burn or violence, shows that the specific principle itself must be present at the point of injury, or else that this principle produces a substance which has the power to excite the specific inflammation with the fibrinous exudate. But, fortunately, whichever of the above theories is true, most physicians agree as regards the indications of treatment, recommending the use of both internal and local remedies; for if diphtheria in its beginning be strictly local, systemic infection quickly occurs, whatever the local treatment, in all cases, unless the mildest. Perhaps in mild, walking cases diphtheria sometimes remains local; but the writer expresses the general opinion of the profession in stating that when diphtheria is of so severe a type that the patient is confined to his room, or so severe that it involves danger, the disease is systemic.

At a meeting of the Epidemiological Society of London, Dr. M. W. Taylor<sup>1</sup> expressed the opinion that common mould might sustain a causative relation to diphtheria. The walls of a sleeping apartment became wet and sodden on July 12. On the 22d, a fungus appeared on the plaster, and in the beginning of August the three children, who occupied the room, and who had not been exposed, so far as could be ascertained, in any other way, sickened with diphtheria. The *aspergillus* and *coprinus* grew abundantly in the mould. In another instance, in which the child died in three days, there was a great development of *penicillum* moulds. A young man had diphtheria severely four days after cleaning out a pigeon loft, where the exuviae, debris and rotten wood were covered with mould. But the theory that the organisms which constitute common mould can under any circumstances produce diphtheria is improbable; else the disease would be of common occurrence. The specific principle must be introduced from without; but it probably finds a nidus favorable for its development upon the wet and mouldy surface of plaster in a room.

*Diphtheria contracted from Animals.*—Dr. F. T. Wheeler<sup>2</sup> states that while in a nesting of wild pigeons, he found many sick with a pseudo-membranous sore throat. He dissected many with his pocket knife, which he was obliged to throw away on



account of the offensive odor. There were millions of pigeons in the nesting, and they were hunted and eaten by the inhabitants. The same year diphtheria broke out in a most malignant form, causing many deaths among the children. Several years prior the pigeons nested in the same locality or near by, and fully half of the children living in the vicinity had diphtheria.

Dr. George Turner<sup>3</sup> states that a pigeon was brought to him for dissection. The whole of its wind-pipe was covered by pseudo-membrane, as in the croup of a child. Pigeons were inoculated in the fauces with this membrane, and a similar disease produced which extended to their eyes through the nostrils. An epidemic of diphtheria occurred in the village of Braughing, the first cases appearing on a farm, where the fowls were dying of a disease similar to that in the pigeon; and on other farms where diphtheria appeared, it was preceded by a similar disease in the fowls. Dr. Turner also mentions several other epidemics of diphtheria in different localities, where the poultry—turkeys, pigeons and, in one locality, the pheasants—perished of a disease attended by this membranous exudation. At Tongham a man bought a chicken at a low price from an infected farm, as it was sick with the prevailing disease, and cared for it at his home. Soon after, diphtheria broke out in his family, and this case was the first in the village. Dr. Turner also cites instances which show that cats, sheep and pigs have suffered from a severe disease of the throat, probably diphtheritic, in several localities where diphtheria was prevailing among children.

*Propagation.*—C. W. Earle,<sup>4</sup> of Chicago, has prepared an interesting statistical paper on the occurrence of diphtheria in salubrious rural localities, free from sewage gas and water pollution. The statistics collected show that this disease is as severe and fatal in the salubrious localities of the newly-settled and mountainous States and Territories of the Northwest, where it happens to be introduced, as in the foul air of the cities. But dampness and decomposing animal and vegetable substances in rural localities, as in the cities, afford a nidus favorable for the propagation of the diphtheritic germ, and therefore increase the prevalence and malignancy of diphtheria. Dr. Earle's statistics also show that the disease may be communicated long distances by railways, and probably by merchandise, and they demonstrate

its extreme contagiousness from person to person. On the other hand, we in the cities have abundant and melancholy proof of the causative relation of foul air, whether arising from the sewers or stagnant filth, to diphtheria.

Dr. Sternberg,<sup>5</sup> in his recent valuable prize essay, alludes to the well-known fact that damp, foul places such as sewers, damp cellars and damp, ill-ventilated spaces under floors little above the ground, afford conditions favorable for the development and propagation of the diphtheritic germ. He also states the opinion—which seems to be borne out by the observations relating to the etiology of diphtheria—that the diphtheritic germ once deposited in damp and foul places, is probably propagated independently of the sick. Thus, in New York City, prior to 1850, although foul sewers and insanitary conditions existed, there was no diphtheria; but in the decade following 1850, diphtheria was introduced. Its germ made its way into the sewers, where, in the filth under the ground, it found a nidus favorable to its propagation; and now wherever sewer gas escapes into the domiciles of that city, it is laden with the germs of diphtheria. In all the streets of New York children are constantly falling sick with this disease, contracted by inhaling sewer gas, which, notwithstanding “sanitary plumbing,” often escapes from unsuspected sources even into the best houses. The amazing vitality and power of propagation of the diphtheritic germ are apparent when we reflect that it has permanently infected the filthy flowing current of the sewers in every part of a great city,—sewers which in their ramifications extend hundreds of miles. It is chiefly by exposure of the children to the sewer gas, carrying with it the diphtheritic germ, which ascends from this widely extending underground culture-bed, and to walking cases, often so mild that there is little or no complaint of the throat or impairment of the general health, that this disease is so prevalent. Children with this mild form of the disease sit among other children in the schools, in the city conveyances, in the churches and in the dispensaries, and not unfrequently communicate a malignant form of the disease, from which the unfortunate victims quickly perish. The germ of diphtheria is of such a nature, and quickly becomes so established in a sewered city which it enters, that it probably never can be “stamped out,” as cholera or yellow fever may be, by the active

measures of health boards or by legislative enactments, although these may do much in the way of protection.

*Diagnosis.* — Although the general seat of diphtheritic inflammation is the faucial surface, and hence upon a visible part, the diagnosis of diphtheria is not infrequently difficult, especially in the first days; and yet a correct early diagnosis is important, not only that the patient may be properly treated, but that suitable measures may be employed to prevent the spread of the disease. M. J. Simon,<sup>6</sup> of the Hôpital des Enfants Malades, Paris, points out some of the difficulties in diagnosis, and shows how an accurate determination of the nature of the disease may be made. He alludes to the well-known fact that products of a white color occurring upon the faucial surface in other forms of pharyngitis sometimes simulate so closely the exudate of diphtheria that there is great liability to wrong diagnosis. He cites cases in which the diagnosis was impossible in the first days; but finally the nature of the disease was apparent from symptoms or sequelæ. Simon alludes to the trouble of diagnosing diphtheria located in the nostrils, and the pseudo-membrane probably present out of sight. The truthfulness of this remark will be recognized by all who have seen much of this disease. The same appearances of the nostrils may be present for days that are common in scrofulous children with severe coryza produced by taking cold. The muco-purulent secretion and small ulcerations at the entrance of the nares, the infection and redness of the Schneiderian membrane, are present in both diseases. These obscure cases of nasal diphtheria may recover without a diagnosis, and we are finally enlightened as to the nature of the disease by the occurrence of a nasal voice or the return of drinks through the nostrils due to paralysis of the muscles of deglutition. Nasal diphtheria is liable to be followed, or after a few days, attended, by symptoms of systemic infection, and these symptoms may aid in establishing the diagnosis. Sometimes, says Simon, in the course of an angina which seemed to be of the nature of a simple inflammation, the occurrence of albuminuria enables us to diagnose diphtheria as scarlet fever, and which of these two may be determined by attending circumstances.

The following is a résumé, in the order given by Simon, of the white products on the faucial surface, which are diphtheritic, or of a different nature, but resembling more or less the diphtheritic

exudate: (1) The diphtheritic membrane; deeply set, and surrounded by mucous membrane, having fibrinous prolongations into the tissues underneath, often accompanied by engorgement of the submaxillary glands. (2) Pultaceous products; that is to say, epithelial elements mixed with mucous secretions. (3) Herpetic products; exuded products from herpetic vesicles in tonsillitis from taking cold, raised, whitish, unequal, dissolving in water, lying upon and not penetrating the mucous membrane. (4) Products resulting from cauterization with nitrate of silver of syphilitic or other ulcerations. (5) Milk spots on the tonsils of small children, which are caseous concretions deposited from the feeding. (6) Confluent muguet, produced in certain low forms of disease, covering the tonsils and their vicinity, and appearing within twenty-four hours. The appearance and progress of this product and its lack of cohesion, indicate its nature. When the diagnosis of the throat affection is doubtful, Simon demands the same precautionary measures as in the diphtheritic disease.

The *Gazette des Hôpitaux* contains an instructive article on the diagnosis of diphtheria from confluent muguet and the pultaceous angina of scarlet fever. If in the course of a depressing disease, as severe measles with complications, or typhoid fever, or protracted summer diarrhœa, we observe a grayish-white elevated product extending irregularly and loosely on the mucous surface, its substance not smooth and compact, and susceptible of removal without injury of the mucous membrane, and without producing hæmorrhage, the disease which has supervened is confluent muguet and not diphtheria. If diphtheria be present we find a grayish white exudate, smooth, depressed, flattened or not elevated, surrounded by mucous membrane completely encasing it, as the crystal of a watch is surrounded by the metallic rim. If the diagnosis between muguet and diphtheria be doubtful at first, it is established and evident in twenty-four or thirty-six hours. In diphtheria the exudate extends towards the air passages, while in muguet the extension is towards the buccal cavity. The microscopic examination and the result of treatment at once reveal the nature of the disease.

Diphtheria occasionally supervenes upon the anginose form of scarlet fever, the two maladies coexisting. But in anginose scarlet fever not complicated by diphtheria, the appearance of the fauces

sometimes so closely resembles that in diphtheria that the diagnosis of the one disease from the other is not easily made. It may aid in diagnosis to recollect that in scarlet fever we observe upon the tonsils an appearance of excavation,—a thick, jagged, irregular, mucous, circumscribed patch, penetrating the lacunæ of the tonsils without any tendency to spread. The appearance contrasts with that of the firm, smooth and deeply set exudate of diphtheria which has a tendency to extend.

*Mortality from Diphtheria.*—The physicians of Leipsig<sup>7</sup> collated the statistics of diphtheria between November, 1884, and December, 1885, and of 1141 cases under treatment, 15 per cent. died, usually between the sixth and tenth days. One-third of those between the ages of 2 and 4 years, inclusive, died.

*Area of Contagiousness.*—Dr. Lancry<sup>8</sup> cites cases to show that the area of contagiousness is small, limited to a few feet. Dumez states that in a school the boys and girls in the same hall, were separated by an open space a few yards wide. Diphtheria prevailed among the girls, but did not affect the boys. Other instances are cited showing that the area of contagion, like that of scarlet fever, is within narrow limits and unlike that of pertussis and measles. The latter diseases, when they enter a domicile or asylum, usually affect all the unprotected children, so wide or so far-extending is their contagiousness.

*Preventive Treatment.*—Dumas,<sup>38</sup> Surgeon to the Hôpital de Cette, recommends, as a preventive of diphtheria, giving to exposed children, in the course of twenty-four hours, a potion composed of 8 drops of tincture of iodine, 10 centigrams (grains 1.54) of iodide of potassium in a vehicle of 120 grams. (4 oz.) But the most effective method of preventive diphtheria is the isolation and disinfection of patients and the disinfection of the apartments, and preventing the inhalation of noxious gases wherever an outbreak of diphtheria has occurred. Dr. H. B. Baker, of Lansing,<sup>80</sup> has published statistics showing that in 102 outbreaks of the disease, the average number of cases where disinfection and isolation, one or both, were neglected, was 16, and the average deaths 3.23; while in 116 outbreaks in which isolation and disinfection were enforced, the average cases per outbreak were 2.86, and the average deaths .66. Therefore these precautionary measures prevented 13 cases and 2.57 deaths

for each outbreak: in the total, 1545 cases and 298 deaths in the year.

Dr. Llewellyn Eliot<sup>27</sup> directs the constant employment upon the stove, over a water bath, of turpentine, so that its vapor fills the room. In every instance where it has been employed no other case has occurred. We will consider hereafter the employment of turpentine as a therapeutic agent in diphtheria, and especially as a means of protecting the household from the spread of the disease.

Whether diphtheria is primarily a local disease, systemic infection occurring subsequently, or primarily a systemic disease with the inflammations occurring as local manifestations, physicians who have carefully observed it clinically agree that blood poisoning quickly occurs in ordinary cases, and that both constitutional and local remedies are required. Proper treatment of diphtheria is far from being determined. Numerous remedies are in use, and many different medicines are recommended by different observers as preferable to all others in controlling the malady. A chief reason why there is such a difference of opinion in regard to the value of remedies is that the disease varies greatly in severity in different localities, and at different times, so that in some epidemics a large majority recover, whatever the treatment, even if it be injurious; while in other epidemics a large proportion perish under the best possible remedial measures. Hence statistics mislead us as to the value of therapeutic agents. The statistics in the following pages show what has been the result of the use of most of the therapeutic agents commonly employed at the present time in both hemispheres.

Dr. N. Lumin<sup>9</sup> gives the following interesting and instructive statistics relating to the treatment of diphtheria. In 1882, when he had care of the hospital of Oldenberg, 296 children were attacked with diphtheria, and 164, or 55 per cent. died. The treatment by the sublimate consisted in brushing the pharynx every two hours with a solution of 1 part to 1000, or in spraying by the irrigator of Rauchfuss with a solution of 1 part to 5000. The patients subjected to this treatment numbered 57. 43 of them had the fibrinous form of the disease and 14 the septic phlegmonous form. 13 of each class died, or 45 per cent. of the whole number. The perchloride of iron, one drop every quarter hour or

two drops every half hour, was administered in 94 cases, 43 having the fibrinous form; 51 having the phlegmonous septic form. The total mortality was 56.3 per cent. Irrigation of the fauces was also employed in these cases with a 3 per cent. solution of boric acid. Lunin made use of chinoline in 28 cases, 19 of the fibrinous form, and 9 of the phlegmonous septic form. 15 died, or 53 per cent. This agent was employed in 5 per cent. solutions, the medium being half water and half alcohol. 29 children were treated by resorcin,—a solution of 10 per cent. being applied by the brush twice each hour, and irrigations with a 1 per cent. solution once every hour. 10 had the fibrinous form, and 19 the phlegmonous septic. 65 per cent. died. Bromine was made use of in 33 patients.  $\mathcal{R}$  bromine, 0.5 to 7.5 grams; potass. bromid., 1.0 to 15 grams; aqua destillat. 200 grams. This was applied by the brush one to three times hourly with inhalation one to three times hourly with the following:  $\mathcal{R}$  bromine and potass. bromid.  $\bar{a}\bar{a}$  0.6 to 1.00—grams 9 to 15; aqua destillat. 300 grams. 69.7 per cent. died.

Finally 23 infants were treated with turpentine (twice daily a tablespoonful, or besides 10 drops every hour). The duration of the treatment was 2–3 days; in one case 10 days. The mean mortality was 43.4 per cent.

In the fibrinous form the percentage of deaths from the different modes of treatment was as follows:—

|                                  | PER CENT. |
|----------------------------------|-----------|
| By turpentine, . . . . .         | 8.30      |
| “ resorcin, . . . . .            | 20.00     |
| “ sublimate, . . . . .           | 30.20     |
| “ chinoline, . . . . .           | 31.60     |
| “ perchloride of iron, . . . . . | 32.60     |
| “ bromine, . . . . .             | 46.7      |

In the septic form the deaths were as follows:—

|                                   | PER CENT. |
|-----------------------------------|-----------|
| By perchloride of iron, . . . . . | 76.5      |
| “ turpentine, . . . . .           | 81.0      |
| “ bromine, . . . . .              | 88.9      |
| “ resorcin, . . . . .             | 89.5      |
| “ sublimate, . . . . .            | 92.9      |
| “ chinoline, . . . . .            | 10.0      |

The value of M. Lunin's statistics is apparent. Having ample opportunities for observation, he endeavored to ascertain the comparative value of the different remedial agents which are in common use in the treatment of diphtheria, by that most reliable of all tests, clinical experience. The writer has noticed

that some of the journals have accidentally made an important error in publishing Lunin's figures. They have printed the column of total percentages of deaths under the title of percentages of deaths in the septic form of diphtheria. This is misleading, since it gives much too favorable a result of treatment. According to Lunin's statistics, turpentine was the most useful agent in the fibrinous form of diphtheria, and the tincture of the chloride of iron in septic, phlegmonous cases. It will be seen, however, that corrosive sublimate was only employed locally. His statistics throw no light on its internal use. The total number of cases of fibrinous diphtheria embraced in Lunin's statistics was 142 with 43 deaths. The number of the phlegmonous and septic form was 122 with 103 deaths. In all the cases, aggregating 296, treated in the Oldenberg Hospital, 164 died.

*Turpentine* has been highly recommended recently by physicians of experience, when used locally as well as internally, for its prompt action in arresting the formation and extension of the pseudo-membrane, and as an antidote to the diphtheritic virus. Dr. Rewentauer<sup>24</sup> states that an infant of 2 years treated by other remedies, began to have symptoms indicating invasion of the larynx on the fourth day. Tracheotomy was resolved upon, but previous trial was made of pure turpentine in a teaspoonful dose. The croupiness ceased, other symptoms improved, and the patient recovered without tracheotomy.

Many recent advocates of the use of turpentine in diphtheria allude to Delthil's treatment by fumigation. By the alleged success of his treatment, he appears to have been among the first to draw attention to the use of turpentine in this disease. His treatment was as follows: A mixture of one kilogram (2 lbs.) of coal tar; 8 tablespoonfuls of turpentine; 8 grams (2 drachms) of resin of benzoin; 100 grams ( $3\frac{1}{2}$  oz.) of cajeput oil. Or, a mixture of 200 grams (7 oz.) of coal tar; 80 grams (2 oz. 6 dr.) of turpentine, or turpentine alone, are constantly burnt in the sick room. The vapors arising from the burning mixture, it is said, are tolerated by the patient, do not cause vomiting, while they appear to aid in arresting the diphtheritic process. Schenker<sup>25</sup> made trial of Delthil's treatment, but modified it as follows: A mixture was prepared of 200 grams (6 oz.) of coal tar and 80 grams (2 oz. 6 dr.) of turpentine. Of this 50 grams ( $1\frac{1}{2}$  oz.) were vaporized at



the bedside, four or five times daily. Each use of the vapor occupied half an hour. It did not cause discomfort to the patient, but produced coughing and a feeling of oppression in well persons. His observations led him to believe that the benefit from this treatment accrued chiefly from the turpentine, and largely from its general effect on the system. He therefore was led to employ turpentine internally in doses of 10 minims to one teaspoonful, one to three times daily, administering it in milk, sugar-water or gruel. At the same time he employed it as a spray. Alcoholic stimulation, cleanliness, and a diet of beef tea, milk and egg were enjoined. Of 36 cases which Dr. Schenker treated by turpentine, 31 recovered.

Röse,<sup>26</sup> of Hamburg, has treated 58 cases of diphtheria with turpentine, with the recovery of 95 per cent. He gave it in teaspoonful doses mixed with spirits of ether (ether 1 part, alcohol 3 parts) three times daily. A teaspoonful of a 2 per cent. solution of salicylate of sodium was also given every two hours. The apparent effects of this remedy observed by Röse were a rapid fall of temperature and pulse-rate, a mitigation of other symptoms, and shortening of sickness. He uses turpentine cautiously in anæmic cases, and in cases of feeble heart action. Sigel states that turpentine in teaspoonful doses reduced the temperature in 47 cases, in 14 of which the symptoms were so severe that the question of tracheotomy arose, but was postponed by the beneficial effect of the turpentine. Of the whole number of cases treated by him with turpentine, 87 deaths occurred, or 14.9 per cent., while in those treated by corrosive sublimate, salicylic acid, potassium chlorate, etc., 32.5 per cent. died. Dr. Llewellyn Eliot<sup>27</sup> was called to operate in two cases of croup. The operation was deferred a few hours, and insufflations of sulphur and the vaporization of turpentine were employed, and in a few hours the improvement was such that intubation or tracheotomy was not necessary. Prof. F. Massei, our Corresponding Editor, states that the resin and essential oil of turpentine are rightly included in the pharmacology of diphtheria. The former is applied by penciling and atomizing; the latter by continuous inhalation.

The recent recommendation of turpentine in the treatment of diphtheria by many physicians of large experience and sound judgment, among whom we might mention A. Jacobi and

Baruch, has extended and established the use of this agent, so that it is now regarded as one of the most efficient and important remedies. Its supposed efficacy depends upon the fact that it is antiseptic and germicidal, and that, whether vaporized and inhaled or taken by the mouth, it penetrates all parts of the system. The descriptions long given in the text-books of the physiological action of turpentine has had the tendency to induce physicians to employ it in small doses. The editor is not aware that any writer has recorded ill effects from the use of turpentine in diphtheria, although it has been so largely employed in the last year or two, and in quantities which exceed the medicinal doses mentioned in text-books. The writer's own method of employing the oil of turpentine, and with such apparent good results during the last two years that he strongly recommends it to the profession, is as follows:—

The accompanying prescription is mixed with water in the proportion of a tablespoonful to each quart:  $\mathcal{R}$  ol. eucalypti, 5ij; ol. terebinth, 3vij.— $\mathcal{M}$ . This is placed in shallow vessels and maintained in constant ebullition, or at least simmering over the stove. In two instances out of quite a considerable number the turpentine ignited, but without harm. The possibility of such an accident should lead to the precaution of removing combustible materials from the vicinity of the stove, whether the fuel be oil, gas, or anthracite. The vapor, which is not unpleasant, soon fills the room and even the entire house. One important advantage of this use of turpentine is that it is apparently a most excellent disinfectant. The editor has a strong belief, based on observations, that it will come into general use as a means of protecting other children of the family, and enabling the physician to attend to midwifery and other practice without risk of communicating diphtheria. As regards the effect on the patient, the turpentine vapor passing over the inflamed surfaces, which are the seat of the exudate, with every inspiration probably produces more or less local disinfection, apart from the systemic disinfection which it may produce by entering the blood and the tissues generally, and thereby diminishes the liability of the extension of the disease to the larynx. While recommending the employment of turpentine vapor, we must not forget that competent and experienced observers like Dr. Baruch, who do not recommend a medicine

without sufficient clinical experience, strongly recommend the use of turpentine by the mouth.

*Tinctura Ferri Chloridi*.—Ferguson<sup>10</sup> regards this agent as the most valuable remedy for diphtheria. He examined the blood daily, or every second day, in twenty cases of diphtheria, and was astonished to observe how rapidly the red blood corpuscles were reduced in number, those remaining presenting an unhealthy appearance. He believes the iron partially arrests the blood change. He administers as much as can be tolerated. To a child of 10 years he gives a teaspoonful of the following mixture every hour in water:  $\mathcal{R}$  tinc. ferri perchloride  $\mathfrak{z}\mathfrak{j}$ ; syr. simplii  $\mathfrak{z}\mathfrak{i}\mathfrak{j}$ .—M. If the stomach does not tolerate the dose, half a teaspoonful is given every half hour. An infant of 7 months, greatly prostrated, took every hour a teaspoonful of the following:  $\mathcal{R}$  tinc. ferri perchloridi  $\mathfrak{z}\mathfrak{i}\mathfrak{i}$ ; syr. simpl.  $\mathfrak{z}\mathfrak{i}\mathfrak{v}$ . A lady of 22 years with great prostration, excessive formation of membrane and very fetid breath, took daily  $\mathfrak{z}\mathfrak{i}\mathfrak{s}\mathfrak{s}$  of the iron for ten days.

M. Jules Simon<sup>11</sup> says: “For internal treatment from 3 to 6 drops of the tincture of the chloride of iron should be given in a little water every two or three hours; but it should not be given with milk or gum water or from a metallic spoon, on account of the decomposition which occurs, which may produce digestive troubles.” Dr. Whittier<sup>12</sup> believes that this medicine, given so as to saturate the system, is the best that can be employed. In 36 consecutive cases in which the fauces were covered with the exudate, all recovered under the use of iron as the principal medicine.

Baruch<sup>13</sup> prescribes hourly doses of this remedy in quantity varying from 8 to 25 drops, mixed with glycerine and water. Food and stimulants are administered before the iron, but not immediately afterward, so that the iron may have a local action upon the faucial surface. Billington recommends hourly teaspoonful doses of the following mixture:  $\mathcal{R}$  tinc. ferri chloridi,  $\mathfrak{f}\mathfrak{z}\mathfrak{i}$ ; glycerinæ, aquæ,  $\mathfrak{a}\mathfrak{a}$   $\mathfrak{z}\mathfrak{i}$ .

Prof. Joseph E. Winters<sup>16</sup> says that he has given 2 drachms every half hour for 48 hours with manifest advantage to a child of 8 years. But it is only in the most severe or malignant form of the disease, the form described by Lumin as septic phlegmonous, that such large doses are proper or are required. In mild cases from 3 to 5 drops, given hourly or oftener, suffice. This is the

dose recommended by Jules Simon, of Paris. Several recent writers make the plausible statement that the indication of treatment by the iron is to saturate the system as soon as possible, employing for this purpose as large and frequent doses as can be tolerated by the stomach. This tolerance of a drug depends largely on the manner in which it is administered. The best vehicle for the iron is glycerine and water or simple syrup. The advice of Simon should be borne in mind, not to give it with gum water, nor milk, nor from a metallic spoon.

That now, after thirty years constant use of the tincture of the chloride of iron in diphtheria, in both hemispheres, there is an almost unanimous verdict in its favor, renders it probable that the few who have not observed good effects have treated unusually bad cases, or have given the medicine in small and inadequate doses. We will see that the opinions of physicians have not remained equally favorable in regard to the use of the agent with which the iron has been commonly combined,—the potassium-chlorate.

*Hydrargyri Chloridum Corrosivum (Hydrargyri Perchloridum—Br. Pharm.).*—This is the most active and certain of the germicide agents employed in medicine, whether used locally or internally. Its use in diphtheria rests upon the fact that it quickly destroys all micro-organisms with which it comes in contact, and upon the supposition that in safe medicinal doses it penetrates all parts of the system. It is employed therefore in the belief that it destroys the specific principle of diphtheria, and thus affords important aid in curing the disease by removing the cause.

Jules Stümf<sup>18</sup> treated 31 cases by inhalation of this drug, with 2 deaths, using the apparatus of Richardson. For infants under the age of 2 years he employed 1 part to 4000; from 5 to 6 years, 1 part to 2000; for those over 6 years, 1 part to 1000.

Dr. Thomas Welch<sup>19</sup> recommends in the treatment of diphtheria, as a gargle or employed as a spray, a solution of corrosive sublimate 1–1000. In most instances when this local treatment had been employed a few times at intervals of one to two hours, the pharyngeal disease began to abate and the general condition improved. Dr. Welch also employed small doses of the bichloride internally. It is evident from the experiences of other physicians that when this agent is employed as a spray in so strong a solution as 1–1000 it should be used with great caution.

Two or three compressions of the bulb of the atomizer will be sufficient. There is of course greater need of cautious use of the spray when the bichloride is given at the same time internally. We shall see that physicians record very beneficial results from the local employment of this agent, without its internal use and in connection with other internal medication.

Dr. P. Werner<sup>20</sup> administers in the treatment of diphtheria the sublimate dissolved in distilled water in half hourly doses or at a little longer interval, so that the following quantities are taken in twenty-four hours:—For an infant of  $1\frac{1}{2}$  years 0.015 (grams 0.231) of the sublimate to 120.0 (4 oz.) of water. To a child at the age of 6 to 7 years, 0.3 to 180 (grains 0.45 to 6 oz.) of water. At night, if the child sleep, the doses should be less frequent and proportionately larger than in the day-time. The author states that the local disease is arrested on the second day of treatment, and on the third day the doses are given less frequently.

Dr. I. N. Love<sup>7</sup> states that he has employed the sublimate in doses of  $\frac{1}{50}$  to  $\frac{1}{100}$  of a grain every hour or second hour, according to the age, preceded by a large draught of water. Its germicide action was both local and constitutional. Prof. A. Jacobi<sup>13</sup> recommends, among other substances employed for washing the nares, a solution of corrosive sublimate 1–2000 to 1–10,000 of water with or without 10 to 50 parts of table salt, or 60 to 300 parts of boracic acid.

Oatman,<sup>13</sup> of Nyack, has lost but one patient in twenty-three by the following local treatment: Cotton is firmly wound around the end of a stick about the size of a lead pencil, being drawn out as it is wound and made to project beyond the end. This is dipped into a solution of the bichloride of mercury, 2 grains to the pint (1 to 3840), and passed into the throat until it touches the posterior wall of the pharynx. It is then instantly withdrawn and burnt. This treatment is repeated hourly, with a new swab each time, until the inflammation begins to subside, which is usually in 48 hours. Klein<sup>19</sup> states that he has often employed corrosive sublimate in diphtheria, but without very good results. Rothe, of Altenburg, used this remedy some years ago, but now employs the hydrarg. cyanate. Dr. F. B. Drescher<sup>22</sup> states that he has made use of the following treatment in diphtheria with marked success:

R̄ hydrarg. bichloridi, gr.  $\frac{1}{2}$ ; spts. frumenti, 3j; syr. simplii, 3j.—M.; one teaspoonful every three hours night and day.

*Remarks.*—The employment of corrosive sublimate in the treatment of diphtheria is not new, since it appears that the late Dr. Tappan prescribed it with apparent benefit in 1860–61. But it was seldom used as a remedy for diphtheria until within the last half dozen years. The establishment of the microbic theory of this disease, and the knowledge that sublimate is a most efficient germicide, promoted its use, so that it has become the favorite remedy with many physicians. Of course its employment demands caution, and is only justified by the fact that the disease for which it is prescribed has heretofore been very fatal with other modes of treatment. But though now widely used for diphtheria, medical journals thus far contain very few reports of its supposed toxic or injurious action, while many physicians believe that it diminishes the virulence of diphtheria and increases the percentage of recoveries. In ordinary cases the following may perhaps be regarded as about the proper quantities, which should be administered in divided doses in twenty-four hours. For a child of 2 years, gr.  $\frac{1}{6}$ ; 4 years, gr.  $\frac{1}{4}$ ; 6 years, gr.  $\frac{1}{3}$ ; 10 years, gr.  $\frac{1}{2}$ . Thus, if we employ the vehicle which Dr. Tappan used one quarter of a century ago, the following prescription might be written for a child of 6 years: R̄ hydrarg. chlor. corros., gr. j; alcoholi, 5ij; elix. bismuthi et pepsini q. s. ad., 3iij.—M. Dose: one teaspoonful each two hours. According to the statements of physicians, considerably larger doses have been administered with safety and apparent benefit, and in malignant cases, such as Lunin designates septic phlegmonous, certainly the maximum medicinal doses are required if we depend on the sublimate as the main remedy. Dr. Grant (Bey) administered to a child of 4 years  $\frac{1}{2}$  gr. every half hour till six doses were taken, and then hourly during the first day, every second hour on the second and on subsequent days at longer intervals. Dr. A. Jacobi<sup>23</sup> states that a baby a year old may take  $\frac{1}{2}$  grain every day for many days in succession, with very little if any intestinal disorder, and with no stomatitis.

It appears from the observations of a considerable number of physicians that good results have occurred from the local use of corrosive sublimate, unaided by its internal administration, and since other very important remedies are required for internal use, it is

a question in the editor's mind whether in the future the use of the sublimate in diphtheria will not be restricted to its local employment. Still, those who denounce the use of all mercurials in diphtheria, like Jules Simon, and one at least of our distinguished American writers, grouping together calomel, the oleate, the unguentum, the cyanide, the biniodide, and corrosive sublimate, condemning them in a body on the ground that they enfeeble the system, do injustice to the therapeutic virtues of the sublimate. Medicines having the same base often differ widely in their medicinal effects, and the writer thinks it is the common belief based on abundant clinical experience, that the sublimate in safe medicinal doses does not enfeeble the system, as calomel is believed to do.

Most physicians use the sublimate at longer intervals after the second or third day, and discontinue its use at or before the close of the week. Perhaps there is no better vehicle of the sublimate than that employed by Dr. Tappan, viz., the elixir of bismuth and pepsin, with the addition of sufficient alcohol to render the mercurial soluble. The writer must state, however, that although the sublimate is recommended by so many experienced and cautious physicians, he at present seldom employs it, although practicing in a city in every section of which diphtheria is constantly present. Alcoholic stimulation, large and frequent doses of iron, turpentine and eucalyptus vaporization, spraying the fauces and nostrils frequently with a solvent mixture to be described hereafter, fill up the round of practice, so as to exclude mercurial treatment, even if it were useful.

*Sodium Benzoate.*—The treatment by fumigations, recommended and employed by M. Renou, which has attracted much attention, is as follows: To water constantly boiling a spoonful of an alcoholic solution of carbolic acid, salicylic acid and benzoic acid is now and then added, so that in 24 hours 10 drachms (40 grams) of carbolic acid, 2 drachms (8 grams) of salicylic acid and 4 drachms (16 grams) of benzoic acid are employed. The quantity may be increased if the size of the room, the age of the patient, and the severity of the disease seem to require it. No local treatment is employed apart from this inhalation. Constitutional treatment and general sustaining measures to the fullest extent are also used. If any symptoms arise showing too much inhalation of carbolic acid, it should be omitted or the quantity reduced.

Barbot<sup>28</sup> has employed Renou's treatment during three years with much success. In 51 cases thus treated 48 recovered. His method is to place on a petroleum stove an earthen pot full of boiling water, into which is put a tablespoonful of Renou's liquid every two hours for adults, and every three hours for children between the ages of 1 and 10 years. A constant temperature of 20° to 25° C. (68° to 77° F.) is maintained in the room. In large rooms the patients' beds are surrounded by sheets nailed to the floor so as to make smaller rooms in which a higher temperature is maintained. The patient's throat is never touched, and the most nutritious diet is employed.

Paterne<sup>29</sup> also recommends treatment by Renou's fluid. 24 patients out of 30 treated by it recovered.

Dr. I. N. Love<sup>7</sup> recommends the sodium benzoate in 5, 10 or 15 gram doses. He remarks that Salkowski, in 1879, noticed that this drug largely increased the secretion from the kidneys of nitrogenous and sulphurous compounds, and concluded that it would be useful in depurating the blood of effete matters. Salkowski, Fleck and Buckholtz ascertained that the benzoate arrested the growth of micro-organisms in putrid liquids, and Graham Brown ascertained that diphtheritic fluids became non-contagious by the addition of the benzoate. Given in syrup and cinnamon water, the solution is not unpleasant.

Helferich, Graham Brown, and Sanné,<sup>30</sup> from experiments made on animals, consider the benzoate of sodium as a specific against the virus of diphtheria. On the other hand, M. Dumas, Surgeon to l'Hôpital de Cette, has not derived any marked benefit from it, but thinks it may be utilized as a preventive. Prof. A. Jacobi<sup>13</sup> says sodium benzoate does not deserve the eulogies bestowed on it from theoretical reasonings.

*Pilocarpine*.—Dr. Lax<sup>31</sup> has treated a number of cases of diphtheria with pilocarpine, with good results. 10 patients, some of them severely sick, treated with pilocarpine, all recovered. This agent produced an increase of the mucous and salivary secretions: large quantities of pseudo-membrane were expelled from the throat and nose, the respiration became free, and the fever ceased. The following was the prescription employed: R; pilocarpini hydrochlorat., gr.  $\frac{1}{2}$  to  $\frac{3}{5}$ ; pepsini, gr. 10 to 12; acidi hydrochlorici., gtt. 2 to 3; aquæ destillat., ʒxviiss.—M. A



teaspoonful or tablespoonful was taken in wine. The writer does not state how often the dose should be given. Guttman treated in a year and a half 81 cases of diphtheria with this remedy without a death. Gelsner and Délewsky<sup>32</sup> also report good results from its use. Frequency of the dose is not mentioned.

On the other hand, the writer has seen the most disastrous results from the use of pilocarpine in diphtheria, the secretions filling the bronchial tubes and being expectorated insufficiently and with great difficulty. Death resulted. The symptoms which occur when pilocarpine acts disastrously are like those in extreme œdema of the lungs. Pilocarpine should not be used in the treatment of diphtheria in young or feeble children, and should be used with much caution.

*Calomel*.—Dr. Geo. B. Fowler<sup>13</sup> considers calomel the best remedy with which to combat diphtheria. When croupy symptoms supervene the dose is increased from  $\frac{1}{6}$  to  $\frac{1}{3}$  gr., or even 1 gr. every hour. Dr. I. N. Love<sup>7</sup> remarks that the most marked recent recommendation of the use of calomel in diphtheria is from the pen of Dr. Wm. H. Daly, Chairman of the Laryngological Section of the Ninth International Medical Congress. The Doctor gives to Dr. W. C. Rester the credit of priority to himself in the use of calomel. Their method is to administer the calomel 2 to 5 grains every 1, 2 or 3 hours until free catharsis follows, and then at longer intervals, but so that three or four daily evacuations are produced. The editor of the *Therapeutic Gazette* writes: "We have so frequently seen an apparently severe attack of diphtheria abruptly aborted in its inception under the influence of large doses of calomel, that we can scarcely believe that the drug has no pronounced effect. A grain of it should be put dry in the mouth of the child every hour or two, until frequent, very loose, liquid evacuations are produced."

Dr. C. H. Richmond<sup>33</sup> relates a case of diphtheria with membranous laryngitis treated by calomel gr.  $\frac{1}{20}$  given every two hours, and insufflation of 2 grains of quinine every two hours. In 48 hours the exudate had disappeared from the fauces and the dyspnœa had diminished. In an epidemic of diphtheria of what Lunin designates the fibrinous form, occurring in the latter part of 1887, in the New York Infant Asylum, 25 children were treated by calomel given in doses varying from  $\frac{1}{6}$  of a grain to 1 grain

about every second hour, and continued day after day. 5 of the 25 patients thus treated died, or 20 per cent.

Dr. S. Baruch<sup>13</sup> begins the treatment of all cases of diphtheria not attended by diarrhœa by a dose of 4 to 8 grains of calomel, followed, if necessary, by a laxative. He cites the experience of Dr. Coester,<sup>34</sup> who administered, in the preliminary treatment of diphtheria, calomel in 69 cases and lost only 1.

Prof. Simon,<sup>32</sup> of Paris, discards in the treatment of diphtheria (1) blisters, which are always followed by the reproduction of false membrane; (2) bleeding and mercurials, which enfeeble the patient; (3) preparations of opium, which produce a rapid depression of the vital powers; and (4) potassium chlorate in large doses. The reference of Simon under the term mercurials is probably more particularly to calomel.

Physicians of good judgment and ample experience recommend calomel in the treatment of diphtheria. Some employ it in purgative doses, and only on the first day. Others, like Prof. Henoeh, of Berlin, administer it during the sickness in fractional parts of a gram ( $\frac{1}{20}$ — $\frac{1}{12}$  gram) every second hour. The majority of physicians, in the editor's opinion, very properly discourage the administration of calomel in laxative doses during the progress of diphtheria, believing that it has a tendency to weaken the patient and increase the anæmia; which in all cases of severe diphtheria soon becomes very manifest, whatever the treatment. There seems to be no valid objection to a single laxative dose of calomel on the first day. It may do good, as in other infectious diseases, to unload the *primæ viæ* in the outset of the disease,—so that the remedies then employed are more readily absorbed and without alteration by admixture with chemical agents in the intestinal tract. This use of calomel is probably beneficial. What change calomel undergoes, so that it can be absorbed into the system, has not been clearly determined. We know that in the presence of free chlorine it becomes a bichloride, and it seems probable that when given alternately with the tincture of the chloride of iron and potassium chlorate, as it has been, the bichloride is formed, since the iron and potassium mixture contains free chlorine.

The statistics of treatment by calomel in fractional parts of a grain do not seem to show a better result than by corrosive

sublimate, and we cannot therefore recommend it as a substitute for the latter.

*Quinia*.—Richmond<sup>33</sup> states that the late Prof. Rochester, of Buffalo, was wont to recommend the employment of quinine by insufflation in diphtheria, powder of two grains being blown into the throat every two hours. “Quinine,” says Ferguson,<sup>10</sup> “does not seem to have any special effect as a remedy for diphtheria. Its action is simply as a tonic. In large doses, which would be necessary to obtain its antiseptic effect, it would be too depressing; while in small doses it is almost useless.”

Quinine has been largely used in the treatment of diphtheria, in small as well as large doses, but usually in connection with other remedies. The editor believes that the general experience of the profession justifies the remark of Ferguson, that it “does not seem to have any special effect” in this disease. Its action in diphtheria when administered internally is similar to that in the other infectious diseases, such as scarlet and typhoid fevers. In small doses it may have some tonic effect; while in larger doses it does not seem to exert any decided action upon the local affections or blood-poisoning of diphtheria. It is not improbable that considerable benefit may result from its local use in the manner recommended by Prof. Rochester; for its local action is antiseptic. The editor sees no reason why its local use, when applied to the faucial, nasal or laryngeal surface in diphtheria, may not be beneficial, as it is stated to be by different observers in pertussis, and for the same reason, viz., its destructive action on microbic life. It cannot be doubted that Prof. Rochester, who was a man of large experience and sound judgment, witnessed good results from this use of quinine, employing it as he did at short intervals.

*Chlorate of Potassium*.—Ferguson<sup>10</sup> totally condemns the use of the chlorate of potassium in any dose or mode of administration in diphtheria. In every case in which he employed it, if albuminuria were present it increased the amount of albumin. Von Focke<sup>36</sup> attributes the efficacy of the chlorate of potassium in diphtheria to the large amount of oxygen in it. To render the oxygen more efficient, he adds hydrochloric acid. He prepares a 2 per cent. solution of the chlorate with a  $1\frac{1}{2}$  per cent. solution of the acid, and administers  $\frac{1}{2}$  to 2 teaspoonfuls every one to two

hours. With this treatment the fever abates, but little glandular swelling occurs.

All the benefit obtained from this mixture may be derived from a prescription long and favorably known in New York, and probably written more frequently than any other prescription for diphtheria. The tincture of iron in the mixture contains one minim of free muriatic acid in each drachm; but a small amount of the acid is added to the mixture in addition. The prescription with some variations in its proportions in the practice of different physicians, is as follows:  $\mathcal{R}$  tinc. ferri chloridi,  $\mathfrak{z}$ ij- $\mathfrak{z}$ ij; potas. chlorat.,  $\mathfrak{z}$ j; acidi muriat. dilut., gtt. x; syr. simplic.,  $\mathfrak{z}$ iv.—*M.* Dose: one teaspoonful hourly or each second hour.

M. Jules Simon<sup>11</sup> says chlorate of potassium, acting wonderfully well in diseases of the mouth, produces no beneficial effect in diseases of the fauces, and it weakens the little patient when given in large doses. Dr. J. P. Esch<sup>37</sup> says that he has observed that the potassium chlorate used internally in diphtheria, almost invariably produces symptoms of nephritis.

Potassium chlorate has probably been employed more than any other remedy, with the exception of the tincture of the chloride of iron, in the treatment of diphtheria. The tendency at present is to administer it in smaller doses than formerly, or abandon its use entirely. It is regarded with suspicion and distrust by a large number of physicians on account of its irritating action on the kidneys.

Now that other remedies having a marked beneficial action in diphtheria have come into use, it is probably better to abandon the use of potassium chlorate, which is a remedy of doubtful efficacy in diphtheria, and which has certainly in large doses done harm by causing or increasing the nephritis. If it be employed, it probably should not be given in larger quantity than  $\frac{1}{2}$  drachm in 24 hours for a child of 5 years, instead of double and quadruple this quantity, formerly recommended. The fact that it is signally beneficial in inflammatory affections of the mouth led to its employment in diseases of the fauces; but it appears to be much less useful in the latter than in the former. It has been commonly employed in combination with the tincture of the chloride of iron, and this admixture has this important advantage, that chlorine is set free.

*Styptic Treatment.*—Dr. V. M. W. Swarts,<sup>37</sup> of Indiana, recommends the application over the affected surface of Monsel's solution, mixed with an equal quantity of glycerine, 3 or 4 times daily. In two to four days, if the patient complains that the application is painful, it should be discontinued, and the surface dusted three or four times daily with sulphur. Longer continuance of the subsulphate retards the process of repair. Immediately after each application of the styptic the patient is allowed to swallow a little cold water. Dr. Swarts believes that this agent prevents bacteria from entering the circulation, and deprives them of the nutriment on which they thrive. Dr. F. B. Drescher<sup>22</sup> recommends the throat to be brushed once or twice daily with sig. ferri subsulphates, ʒij; glycerinæ, ʒij.—M.

For many years the writer has employed this agent in the following formula: R̄ acidi carbolici, gtt. x; sig. ferri subsulphates, ʒiij; glycerinæ, ʒj.—M. To be applied with a large camel's hair pencil every 3 to 6 hours. During the last two years he has doubled the amount of glycerine. It is an efficient lotion, deeply penetrating the pseudo-membrane, stopping immediately microbic movements, and rendering the membrane an inert mass. It also gives great satisfaction to the friends, since a considerable amount of pseudo-membrane and congealed mucus is brought away with the brush. But it is an unpleasant operation, much dreaded by the patient, and though efficient, it is perhaps better that other modes of local treatment less disagreeable be employed in its place.

*Permanganate of Potassium.*—Eug. Pirkler,<sup>30</sup> of Buda-Pesth, employs a 1 to 2 per cent. solution of this agent, brushed upon the surface of the throat once or twice daily. He uses in the interval a gargle of chlorate of potassium and lime-water.

*Bromine—Bromide of Potassium.*—Paul Hesse<sup>30</sup> renounces brushing the throat, but employs antiseptic inhalations. He employs a 2 per cent. aqueous solution of equal parts of bromine and bromide of potassium, regulating the inhalation according to the gravity of the case and the degree of irritation, but gives no statistics. Le Gendre<sup>21</sup> recommends the following prescription: R̄ bromine (pur.), potass. bromid., āā gr. viij.—gr. xv; aq. destillat, ʒl. For penciling the pharynx every 2 or 3 hours.

*Cyanide of Mercury.*—Le Gendre<sup>21</sup> gives the following formula for the exhibition of the cyanide. R̄ hydrarg. cyanide,

gr.  $\frac{3}{10}$ ; tinc. aconit.,  $\text{℥xxv}$ ; aq. destillat.,  $\text{℥xv}$ . Dose: one teaspoonful hourly.

*Solvent Treatment.*—*Papayotin.*—Rossbach<sup>20</sup> states that he uses a solution of papayotin frequently applied to the fauces. In very young children a few minims may be placed on the tongue every five minutes. If the drug be good the membrane is dissolved in 2 or 3 hours. Prof. Jacobi<sup>13</sup> says the drug is easily dissolved in 20 parts of water. It may be injected or brushed over the membrane or used as a spray. Mixed with water and glycerine in greater concentration, 1 to 4–8, it has also been used by him with fair results. Dr. J. K. Bauduy, Jr.,<sup>7</sup> states that he has employed papayotin in three cases, at first using a 5 per cent. and afterward a saturated solution. Under its use the exudate diminished, and the fever and other symptoms abated. He believes that this agent has not only solvent, but germicide properties.

*Pepsin.*—Richmond<sup>33</sup> recommends the insufflation of pepsin rubbed up with  $\frac{1}{4}$  part of sugar of milk every two hours. A case of croup treated with this and  $\frac{1}{20}$  gr. doses of calomel recovered.

*Trypsin.*—Dr. E. N. Liell<sup>33</sup> states that the application of trypsin has proved successful in softening the membrane. It not only dissolves the exudate, but also produces reduction in temperature. Dr. F. C. Fernald<sup>31</sup> relates the case of a boy of  $6\frac{1}{2}$  years, who had perforation of each membrana tympani, and began to complain of sore throat. A pseudo-membrane of little extent appeared upon the tonsillar portion of the fauces, and the right auditory canal was covered with a diphtheritic exudation so occluding it that liquids did not flow from the external ear to the fauces as formerly. The ear was filled every half hour with the mixture:  $\mathcal{R}$  tripsin, gr. xxx; sodii bicarb., gr. x; aqua destillat.,  $\mathfrak{z}$  j.— $\mathcal{M}$ . The membrane gradually dissolved and disappeared. The passage through the ear and Eustachian tube became open, and the patient recovered.

The belief is becoming prevalent that the early destruction and removal of the exudate from the faucial or nasal surface is not an imperative duty, as was formerly practiced under the teachings of Bretonneau and Trousseau, provided that thorough disinfection of the exudate and surrounding and underlying tissues be effected. Patients are injured by irritating lotions, or instrumental treatment designed to remove the pseudo-membrane, which immediately

reappears in greater extent and thickness than at first on account of the increase in the inflammation, in consequence of the severe measures employed. The substitution and employment at short intervals of mild, but efficient antiseptic applications in place of the stronger and irritating lotions formerly used, has been a great improvement in the treatment of diphtheria. But antiseptic lotions, vapors or sprays are inadequate to produce complete disinfection if the pseudo-membrane have great thickness. Its under surface, which is in immediate relation with the lymphatics and blood-vessels, and from which systemic poisoning occurs from the absorption of the diphtheritic germ, septic matter or ptomaines, is probably not reached by the antiseptic sprays or lotions as commonly employed. Any painless and unirritating application which diminishes the thickness of the pseudo-membrane by its solvent action, or, better, entirely dissolves and removes it, is therefore useful. Of the unirritating solvents, alkalines, papayotin, pepsin and trypsin have been most used, and have in the highest degree the confidence of the profession. The efficiency of solvent treatment depends largely on the manner in which it is employed, the kind of instrument used, and the frequency of the application. The solvent agent heretofore most largely used has been lime-water, or the spray of slacking lime. Its solvent action is probably due to its alkalinity, and the efficiency of lime-water may be greatly increased by adding to it the bicarbonate of sodium. During the last two years the writer has employed the following formula in the ordinary form of diphtheria and in diphtheritic croup, with results so good that he can confidently recommend its use:  $\mathcal{R}$  listerine,  $\mathfrak{z}\text{j}$ ; sodii benzoat. and sodii bicarbonat.,  $\text{āā}$   $\mathfrak{z}\text{ij}$ ; glycerinæ,  $\mathfrak{z}\text{ij}$ ; aq. calcis, Oj.—M. To be used with the hand atomizer from 3 to 5 minutes every half hour, or in cases not urgent at longer intervals. Listerine, whose composition is known to the profession, is not a solvent, but it is antiseptic to a certain extent, and is fragrant; but 1 drachm of oil of eucalyptus may be substituted for it, with perhaps equally good result.

Trypsin, unlike pepsin, is an active solvent in an alkaline medium, and it may be added to the mixture employed in these cases. It is probable, in the present state of our knowledge, that no better solvent can be employed than the above with the trypsin added; but it must be added in moderate quantity, or it will clog the atomizer.

*Salicylic Acid*.—Dr. W. F. Sharrer,<sup>40</sup> Indiana, states that he saves over 90 per cent. of his patients with the following prescription:  $\mathcal{R}$  acidi salicyl., 3j; spts. etheris nitr., 5ij; aquæ, 3iij; sodii bicarb., gr. xx.—M. Mix in an open vessel and bottle when effervescence ceases. Give one teaspoonful every 3 hours. A mixture of the tincture of the chloride of iron and potassium chlorate is also employed. E. S. Smith<sup>1</sup> prescribes 10 to 20 grains to be taken every two to four hours in mucilage combined with succus belladonnæ if pain be present. M. Jules Simon<sup>11</sup> recommends for the local treatment of diphtheria the following:  $\mathcal{R}$  acidi salicylic, 0.50 centigram=grs. vij; decocti eucalypti, 60 grams=5xv; glycerinæ, 30 grams=5vij; spirits rect., 12 grams=5iij.

This mixture should be applied by means of lint wound around the end of a pencil or stick, and we should press firmly (*frotter*) and not merely brush the faucial surface. But the application should not be made with such force as to promote bleeding. The object should be to disinfect the entire faucial surface and the pseudo-membrane, without irritating or injuring the parts. The application should be made hourly in the day-time and every two hours at night.

*Copaiba*.—*Cubebs*.—M. Jules Simon<sup>11</sup> recommends for patients above the age of 5 or 6 years, copaiba and cubebs. He prescribes the oleo-resinous extract of cubebs in doses of 4 to 6 grams, in an aromatic vehicle, or the following mixture dispensed in boluses:  $\mathcal{R}$  cubebs, 30 grams; copaiba, 60 grams; ferri subcarbonat., 4 grams; bismuth subnitrat., q. s. to solidify.

*Vinegar*.—Dr. F. Engleman<sup>41</sup> recommends vinegar for the local treatment of the fauces in diphtheria, 1 part to 4 of water as a gargle, and 1 part to 2 or 3 when applied by brush. He finds it more useful than a 5 per cent. solution of carbolic acid. The addition of 3 parts of vinegar to 10 of a putrid liquid completely arrests the development of micro-organisms. Raclé,<sup>31</sup> of Algiers, also recommends a gargle of acetic acid.

*Chlorine Water*.—Mix chlorine water 2 parts and water 1 part in a colored bottle, and give 1 teaspoonful hourly at first and subsequently every two hours. In a number of severe epidemics the chlorine water employed in the beginning checked the spread of the patches.<sup>7</sup>



*Sodium Hyposulphite*.—Dr. I. H. Fruitnight<sup>13</sup> has employed this agent in 8 cases, giving hourly drachm doses of the following solution: sodii hyposulph., ʒj; aquæ, ʒij. Result was favorable, the pseudo-membrane gradually disappearing.

*Iodoform*.—Le Gendre states<sup>21</sup> that iodoform may be used locally in the following formula: R̄ ether, ʒvi $\frac{1}{4}$ ; balsam tolut., ℥lxxv; iodoform, gr. xxxviij. It may also be used in powder with sugar 1 to 3.

*Biniiodide of Mercury*.—Illingworth<sup>1</sup> considers the biniodide of mercury a specific for scarlet fever and diphtheria. Its efficacy he thinks depends on the diffusible potassic iodide carrying the germicide biniodide to every part of the circulatory system. In diphtheria the membranous exudation, he says, is rapidly removed and the fever abates, and in scarlet fever defervescence sets in immediately after the administration of this agent. Dr. John W. Watson employed biniodide of mercury in a severe attack of diphtheria. The exudation had formed rapidly, covering the uvula, tonsils, and adjacent parts of the palate and pharynx. The patient, a girl of 13 years, was treated with the biniodide as recommended by Dr. Illingworth; but before its application each time she gargled with a solution of corrosive sublimate (1 to 3000). She refrained from hawking, swallowing or coughing, and an hour subsequently her throat was gargled with lime-water. This treatment was repeated every six hours except in sleep. Iron and potassium chlorate were also administered. After a week the exudate entirely disappeared. As the bichloride of mercury was also employed, it is impossible to determine to what extent the biniodide was useful.

*Alcohol* in large quantities is justly regarded as a most important remedy, and most physicians will accept the remark made by a distinguished author that there is more danger of giving too little than too much. In the septic form especially, a quantity is required each day which would produce intoxication in a state of health. There is more unanimity in regard to the beneficial effects of alcohol in diphtheria than of any other medicinal agent; and not a few physicians have attributed recovery more to the alcohol employed than to any other medicine. The milder forms of diphtheria, attended by little evidence of systemic infection, require but a moderate quantity of alcohol; but severe forms of the disease, attended by a large amount

of exudation with swelling of the inflamed parts, and progressive anæmia, require alcohol from the commencement of the attack, and in liberal amount. In this form of diphtheria a child of 5 years can take a teaspoonful of brandy in milk hourly without intoxicating effect. Larger doses have been reported with apparently good results.

*External Treatment—Treatment of the Neck.*—M. Jules Simon<sup>11</sup> says that for application over the enlarged and painful glands some oily substance should be employed. The use is recommended of such substance containing iodide of potassium as a resolvent. Simon employs a pomade containing belladonna and hyoscyamus. He discourages the use of ice around the neck in consequence of the danger of producing complications in the respiratory apparatus.

Dr. Werner recommends the application by friction three or times daily, the use of ichthyol over the inflamed glands and four connective tissue upon the side of the neck in diphtheria. Dr. Grant (Bey) recommends for external treatment of the swollen glands of diphtheria an ointment of iodoform 1 to 10 to be rubbed in every three hours.

*Hydrate of Chloral.*—Dr. C. B. Galentine states that in more than 500 cases treated with this agent since 1875, less than 2 per cent. have died. To a child of 6 years he administers the following prescription in teaspoonful doses, omitting it during sleep:  $\mathcal{R}$  chloral hydrat., gr. xl; potas. chlorat., gr. xxx; sacch. alb.,  $\mathfrak{z}$ ij; aquæ,  $\mathfrak{z}$ ij. The medicine is given hourly without subsequent drink for five minutes.

*Sulphurous Acid.*—Herbert L. Snow<sup>1</sup> states that this agent in full and frequent doses causes rapid disappearance of the pseudo-membrane. He administers a drachm every  $\frac{1}{2}$  hour to 2 hours in syrup. G. Parker May<sup>1</sup> states that he has used successfully a mixture of sulphurous acid, carbolic acid, tincture of the perchloride of iron with potassium chlorate and glycerine, with the brush or spray three or four times daily. He also gives a mixture consisting of carbolic acid, tincture of the chloride of iron, sulphurous acid, with potassium chlorate and glycerine. A tablespoonful every three or four hours. E. S. Smith<sup>1</sup> recommends, used as a spray, freshly prepared sulphurous acid with twice its bulk of water.

*Hydrogen Dioxide.*—Dr. Hofmohl<sup>43</sup> made a trial of the dioxide of hydrogen in diphtheria. He administers every hour or two a teaspoonful of a 2 per cent. solution, and in addition allows the patient to inhale the same drug by the aid of Siegle's apparatus. The first effect is a slight increase of temperature; occasionally it causes vomiting. He has thus far treated 50 diphtheritic patients with  $H_2O_2$ , and believes that the favorable result in certain grave cases was largely due to this agent.

*Oil of Eucalyptus.*—E. S. Smith<sup>1</sup> recommends this drug, 10 drops to half a pint of water, inhaled five minutes every hour or two. Dr. J. V. Stevens<sup>44</sup> states that a child with diphtheria, and having symptoms of croup, improved rapidly by the use of extract of eucalyptus as a spray. When the spray was discontinued the croupiness increased; but after its use was resumed, the child soon began to convalesce.

*Chinoline.*—This is employed by swabbing, in the following formula:<sup>45</sup>  $\mathcal{R}$  pure chinoline, 10 grams; distilled water, 100 grams; alcohol, 100 grams. For irrigation:  $\mathcal{R}$  pure chinoline, 2 grams; distilled water, 1000 grams; alcohol, 100 grams.

*Warburg's Tincture.*—E. S. Smith<sup>1</sup> states that a child of 4 years, apparently nearly moribund from blood-poisoning and exhaustion after diphtheria, was given ten drops of Warburg's tincture every two hours, and was soon out of danger. (J. L. S.)

#### WHOOPIING-COUGH.

During the year 1887 the publications concerning whooping-cough have been unusually numerous; but the real progress made in our knowledge of this malady and its successful treatment can hardly be said to be commensurate with the abundance of new material added to the literature of the subject. The only important publication on the etiology of the disease was made by a Russian physician, Afanasiëff.<sup>81</sup> This careful observer claims to have discovered the causative agent of pertussis in the shape of specific bacillus, which is said to differ from all other known bacteria. Under the microscope it presents in the shape of small rods, occurring singly or in pairs, or even in chains. The length of these short rods is stated by Afanasiëff to be 0.6 to 2.2 micromillimetres. The cultures also have peculiar qualities of their own. Inoculations practiced upon animals have resulted in

producing symptoms resembling human pertussis. In the bodies of animals dying after the implantation of these microbes, the air-passages were found in a condition of congestion and catarrh. The mucous coating of the respiratory organs, as well as the pneumonic patches found in the lungs, contained the specific bacilli in abundance. In the bodies of children who had died from whooping-cough, the same appearances were found. These important observations have been confirmed by another Russian observer, Seintschenko,<sup>82</sup> who emphasizes the fact that examination of the sputum reveals the bacilli. The writer has likewise examined the sputum of patients suffering from whooping-cough; and while the bacilli of Afanasiëff were undoubtedly present, they by no means appeared "almost as pure cultures," as described by that author. On the contrary, in some cases their number was quite insignificant as compared with the abundance of the different varieties of microbes usually found in sputum mixed with oral secretions. While, therefore, the exciting cause of pertussis may actually have been discovered, it remains to be seen what benefits are to accrue to the practitioner from this discovery.

The condition of the human larynx in pertussis has been accurately described by von Herff,<sup>39</sup> who studied the appearance of his own larynx during an attack of that disease. His observations may be summarized as follow: During the entire course of the malady there exists a moderate amount of inflammation of the mucous membrane lining the respiratory tract. This inflammation extends from the posterior nares down to the bifurcation of the trachea. The intensity of the inflammation varies in different parts of the respiratory tract. It is quite pronounced at the arytenoid cartilages, and the cartilages of Santorini and Wrisberg; but the posterior wall of the larynx between the vocal cords and the under surface of the epiglottis are most severely affected. The vocal cords themselves remained intact in the author's case. During a paroxysm a small pellet of mucus was visible on the posterior wall of the larynx at the level of the glottis. On removal of this pellet of mucus the paroxysm promptly ceased. Irritation of the part of the larynx referred to provoked a coughing fit; but other parts could be touched without bringing on a paroxysm. The author therefore expresses the opinion that the inflammation of the mucous membrane in the interarytenoidal

region is closely connected with the peculiar attacks of coughing characterizing pertussis.

*Treatment.*—In the management of pertussis many new remedies and methods of treatment have been proposed. Narcotics and sedatives have always been largely used. Vetlesen<sup>71</sup> recommends the following combination of Indian hemp and belladonna: R̄ exts. cannab. indic., gr. xv; exts. belladonnæ, gr. vij; alcohol. absolut.; glycerini, āā f̄ziss. This mixture is to be given to children of 8 months to 1 year in 4–5 drop doses; 1 to 2 years, 5–8 drop doses; over 12 years and adults, in 15–20 drop doses. In 116 cases treated by this mixture, the result is reported as favorable in 83 cases, and as excellent in 30. Injurious effects were never observed. Narceine has been warmly praised, but according to the testimony of Dr. Llewellyn Eliot<sup>69</sup> it is not a safe remedy, and its effects are not favorable. Cocaine has been quite extensively employed, both internally and as a local application to the throat, nares and larynx. Concerning the question of the safety of employing it in young children, Dr. L. E. Holt<sup>33</sup> says: (1) it must be used with great caution in young children, under all circumstances; (2) the spray is never to be recommended, since an uncertain quantity is given; (3) solutions stronger than 4 per cent. should not be used in children under two years; (4) in cases where it was tried, he failed to see any notable benefit; (5) chloral seemed to be of very decided value in controlling symptoms due to cocaine. Labric<sup>28</sup> says that repeated painting of the throat with a 5 per cent. solution of cocaine causes an immediate lessening in the number of paroxysms. It is necessary to repeat it often, as the effect is evanescent. Prior<sup>19</sup> recommends a 30 per cent. solution, which is certainly much stronger than seems advisable. Pick asserts<sup>9</sup> that the inhalation of carbolic acid gives the best results in whooping-cough. The failures of this remedy reported were due for the most part to too great dilution. By means of a special mask which he has made, he administers 15 to 20 drops of the pure acid, on a roll of cotton, introduced into the mask. The inhalation is carried on for several hours every day, the cotton wad being renewed three times a day. No ill results have occurred, and the duration and violence of the disease were notably lessened.

Dr. B. W. Richardson<sup>83</sup> reports that he has treated 9

cases of whooping-cough with peroxide of hydrogen exclusively. The solution was given in doses of a fluidrachm five or six times a day. The remedy in this affection has a decided value. Commencing with it in the acute stages of the disease, and trusting to it alone, he has never seen pertussis cut short so quickly by any mode of treatment except change of air. He had previously used dilute nitric acid in whooping-cough, as advised by the late Dr. Gibb, and with satisfactory results. The peroxide appears to him to act in a manner very similar, but, he thinks, with more effect. It subdues the spasmodic paroxysm, checks the secretion in the throat, and shortens the period of the malady, lessening thereby the dangers of after-effects. The mode of prescribing it is: R; hydrogen peroxide (10 vols. strength), 5vj; glycerine, pure, 5iv; water distilled to 3iij; half a fluid ounce to be taken in a wineglassful of water; when there is stridulous spasm with the cough he substitutes ozonic ether 5ij for the solution of the peroxide, or adds it to the mixture. Antiseptics have been used in every conceivable way. Iodoform, the salicylates, resorcin, corrosive sublimate, sulphurous acid, eucalyptus, pure benzol are some of the most important innovations,—the authors of the various articles recommending them being very favorably impressed with their employment. No particular antiseptic should be inferior to all others. Either they are all useful in destroying the presumed microbe, or else none of them have any great value.

Perhaps of all recent drugs antipyrine has been most extolled. There is certainly a growing sentiment in its favor. Sonnenberger,<sup>57</sup> who has had a very extended experience, regards it as the best remedy in our possession. He gives  $\frac{1}{7}$  of a grain to very young children, and gradually increases the dose to 15 grains for adults. The medicine is given three times a day, and once at night, if necessary. The average duration of the disease is reduced to from 3 to 5 weeks under this treatment. He also claims that the frequency of the paroxysms is reduced to 6 or 7 occurring in the 24 hours.

Acting on the supposition that pertussis is a reflex disorder of nasal origin, many remedies have been applied to the nares. Various antiseptics and quinine appear to have been employed with good results. Bachen<sup>28</sup> recommends the following mixture: R; quinine, 100 parts; benzoin pulv., 5 parts. About 15 grains

of this powder are blown into the nose every 24 hours. Kolover<sup>79</sup> sprays the fauces with the following solution:—℞ quiniæ sulph., gr. 50; acid sulphur., gtt. 30; aquæ destill.,  $\bar{z}$  5 $\frac{2}{3}$ . This may be used every two hours for the first three days, and every three hours for the remainder of the first week, after which it will be unnecessary. If powders are used, they should be made very fine, almost impalpable. Regular insufflators must be employed, and care is to be taken that the topical remedies, if poisonous, are not swallowed. Moizard<sup>61</sup> occasionally advocates the following for insufflation:—℞ benzoin pulv., 5 parts; bismuth salicyl., 5 parts; quiniæ sulphat., 1 part. In addition to the authors already mentioned as favoring insufflation, Dr. Holloway's<sup>1</sup> enthusiastic recommendation of pure boric acid may be remembered. He has constructed a special insufflator, and is highly pleased with the results of his treatment. He confines the patient to one room for a week or ten days, and has each nostril insufflated every three hours during the day, and once at night, with from 2 to 3 grains of the finely powdered boric acid. He has discarded the admixture of coffee to the acid, as recommended by Guerder,<sup>31</sup> of Paris. *Grindelia robusta* has found favor with many observers, notably several French physicians,—Bilhaut,<sup>84</sup> Cadet de Gassicourt,<sup>84</sup> Constantin Paul,<sup>84</sup> and others. In our country this drug has not yet an established reputation for efficacy in this disease.

A prolonged discussion on whooping-cough took place at the Sixth German Congress for Internal Medicine, held at Wiesbaden. Vogel, Hagenbach, Michael, Heubner, Prior, Schlieb, Sonnenberger, Binz and Cohen were the principal speakers.<sup>19</sup> A wide diversity of opinion prevailed. But the general sentiment of the German observers appeared to be that laryngologists and bacteriologists would have to work out the problems presented by this disease. It is to be remarked in this connection, however, that the Congress convened before the publication of Afanasieff's discovery. (E. C. W.)

#### BRONCHITIS.

*Etiology.*—Simon<sup>85</sup> speaks of a tracheo-bronchitis occurring in winter under bad hygienic surroundings. The symptoms are hoarseness, a continuous cough with pain, and attacks of spasm in the air passages. Auscultation is almost negative. There is fever, which abates after a few days. Meanwhile the cough and

signs of catarrh still continue and finally become chronic. Even then auscultation and percussion are negative. At the most, there is a roughness of the respiration. In a favorable case, one thinks of an affection of the bronchial glands; a more or less severe form of bronchitis frequently occurs during the course of summer diarrhœa in children, and is liable to be attended with collapse of the lungs, especially in the very young or weak. Dessau<sup>74</sup> has met with many cases of the unilateral form of bronchitis affecting special areas of the lung involved.

*Treatment.*—Dessau<sup>74</sup> says that a simple bronchitis of the larger tubes has a duration of only a week or ten days under proper treatment, and is devoid of danger in ordinary cases. It may be, in weak infants, the exciting cause of fatal atelectasis or bronchopneumonia. The danger increases as the smaller bronchi become involved from the increased apnœa. After recovery from a severe attack, there seems to be a certain susceptibility established to take cold readily; a slight bronchitis, involving only the larger tubes in children of certain constitutions, may cause enlargement of the lymphatic glands at the root of the lungs, which speedily become caseous and infect the various organs of the body with tubercles. If the bronchitis becomes chronic, the cough is apt to be spasmodic, especially troublesome in the morning and evening, and though disappearing during the summer months, returns with the cold season. Every change of weather is accompanied by an increase of symptoms, and the general health suffers from this constant irritation. Dr. Carmichael<sup>17</sup> says: "Whatever the age of a child, it will generally require stimulants. Every case should be treated strictly on its own merits, and with the regard to the constitutional peculiarities of the child."

When the larger tubes only are affected, Dessau recommends for a child of 6 months, 1 drop of ipecac and of antimony half a drop, given together every hour. In severe cases, accompanied by elevation of temperature, involving the medium and small tubes, he gives tincture aconite root, half a minim to one minim every hour. Friedländer,<sup>31</sup> of Russia, recommends antipyrine in cases with high temperature. He found that 9 grains sufficed to influence children under 2 years of age for 24 hours. 13 grains, in children under 5 years, lowered the temperature for 12 to 15 hours. Profuse perspiration, lessened cough, sleep and general



improvement followed. In convalescence the dose was reduced one-half. These doses are much larger than those usually found efficient. The drug is generally given with some alcoholic to prevent the depressing effects which have been observed in some cases, in doses of from 2 to 8 grains in children of from 3 to 5 years of age. Dr. Carmichael<sup>47</sup> says that perhaps the most useful of all expectorants in children are the alkaline carbonates, combined in minute doses of sodium or ammonium iodide. Simon advises the administration of iodide of potash to the mother when the nursing child has bronchitis. The turpentine group have long been used in the chronic forms of bronchitis, especially those forms accompanied by bronchial spasm. Of these, terebene is perhaps most used. It should be given every four hours on sugar, from 2 drops to 5 drops, according to the age of the child. It has also been used with good results in acute cases. The poisonous effects of turpentine have been noted in a few cases. Dr. D. M. Cammann<sup>13</sup> noticed that the greatest effect is produced upon the dyspnœa. The expectoration also was thinned and lessened in amount, and the cough became less frequent. If the child objects to the burning taste of the terebene, we may substitute terpine hydrate, which is tasteless, and in similar doses has a nearly identical medicinal effect. Dr. Bleyer<sup>13</sup> recommends the dioxide of hydrogen in the chronic bronchitis with dyspnœa, as improving the digestion, giving great relief to the dyspnœa, acting like opium in this respect without its narcotic effects. 1 teaspoonful in a ten volume solution may be given in a glass of water three times daily.

#### EMPHYSEMA.

*Pathology.*—An interesting case is reported by Dr. Hodge,<sup>63</sup> in which a slight emphysematous swelling was noticed on the right side of the face and over the right chest. The emphysema followed pertussis. The swelling steadily extended to the left side of the face, the left chest, then over the whole trunk and upper extremities, then down the lower extremities, seeming to follow the course of the great vessels. The areolar tissue at the base of the lung and the anterior mediastinum were found infiltrated with air. There was some pneumonia of both lungs, and collapse of the left lower lobe. Large blebs were present on the anterior surface of the lungs, and the subpleural tissue was infiltrated with air.

## ATELECTASIS.

J. L. Smith<sup>33</sup> described two varieties of this affection,—the asphyxia lividum and asphyxia pallidum. The former, or the apoplectic form, is characterized by a muscular tonicity. The head, limbs and lower jaw do not drop when the child is raised. The cutaneous, and, to a certain extent, the mucous surfaces, have a dusky color. There is general venous congestion. The tongue and lips are sometimes swollen. The asphyxia pallidum is characterized by general lack of muscular tonicity. The head, the limbs, and the lower jaw drop; the eyes are glassy and the pupils more or less dilated. The color of the surface is pale, the general appearance markedly anæmic. Asphyxia lividum becomes asphyxia pallidum before death takes place.

Dr. Garish<sup>33</sup> has frequently met with cases in which ergot seemed to have caused collapse of the lung in the child after prolonged labor. He has frequently met with these cases, and believes that ergot is therefore contra-indicated before the birth of a child.

Simon<sup>85</sup> says that in many cases of collapse in the course of bronchial catarrh the smaller tubes are often not affected, and prompt energetic measures will suffice to restore the lung to its natural condition. In extensive capillary bronchitis, it may be doubted whether complete or partial reinflation will ever take place. In most, if not all, cases where atelectasis remains, and the child lives, the congestion is followed by an inflammatory process,—pneumonia.

When atelectasis complicates broncho-pneumonia, prognosis is dependent upon its extent and upon that of the pneumonitis. The collapse is generally a sign of the great weakness of the child, the onset of the last stage.

## BRONCHO-PNEUMONIA.

Simon<sup>85</sup> defines broncho-pneumonia as an inflammation of the smallest ramifications of the bronchi, and of the pulmonary alveoli,—that is, an intracanalicular inflammation. There are inflammatory phenomena in both lungs, but the intensity and symptoms differ in different parts of the air passages. Darieu<sup>86</sup> found that the anatomical lesions of pneumonia complicating diphtheria were

characterized by an abundance of fibrine and hæmorrhagic foci; that two varieties of micro-organisms are found in the lungs: (a) spherical or oval micrococci arranged in chains; (b) bacilli constantly resembling those found in pseudo-membraneous deposits. On account of the great numbers and the method of distribution of these micro-organisms in the inflamed lobules, the writer advanced the hypothesis that the bacilli reached the lobules and caused inflammatory action, which results in producing a medium favorable for the development of microbes, and the bacilli multiply in this medium and cause suppuration in the lobules. Balzar and Grandhomme,<sup>25</sup> from recent autopsies of syphilitic still-born children, conclude that syphilitic lesions, which are caused by microbes, do not appear to preserve any specific character in their evolution. Syphilitic pneumonia may be classed with broncho-pneumonia in the same degree as secondary pneumonia in acute infectious diseases.

*Symptoms.*—Broncho-pneumonia is clinically divided into three general classes by Simon:<sup>85</sup> The first, which kills as by a stroke of lightning, in 24 to 36 hours; another whose duration is generally eight to ten days,—the prognosis in both these classes being very bad. The third form, which we find in more than half of the cases, is quite irregular in its course. The ordinary duration varies from three weeks to a month, and the prognosis is favorable. In the first set of cases the inflammation extends to all parts; the congestion is general; obstruction is complete, giving place to all the symptoms of asphyxia. Oppression is excessive; the eyes are injected; the temperature rises above 104° F., with weak and hurried pulse and rapid respiration, and the functions are arrested. In the second set of cases the course of the disease is at first more assured. There is less asphyxia, fever, symptoms of toxæmia, and impaired hæmatosis. The oppression is less extreme, muscular efforts of respiration less violent, the cyanosis less marked. These symptoms appear gradually, however, the cough becomes almost constant, the temperature to 104° or 108° F., and the patient dies asphyxiated. The onset of the third form is more insidious. During a light attack of whooping-cough, for instance, a little malaise is noticed in the evening, with some fresh coryza and sore throat. There are no physical signs, except a few sonorous râles. Meanwhile a high fever comes on rapidly, the

temperature reaching 102° or 104° F. The pulse rate rises to 140 or 150, and the child becomes agitated, though the cough seems less hard for a time. After the small bronchi are invaded, the respirations rise to 60, 80 or 100 per minute; the dyspnoea is pronounced; the cough incessant, hard and painful; no expectoration is seen, as the children swallow the mucus coughed up. Now the nostrils dilate; the inspiratory muscles are exerted strongly; the face is pale, the lips blue, the conjunctiva injected, and there is the characteristic grunting expiration of pneumonia. On the third or fourth day there seems to be an arrest of the process. The pulse falls to 120, and the temperature to 99° or 100° F. The paroxysms of coughing and the restlessness are less severe. The next day this improvement rapidly disappears to make place for an alarming exacerbation, which lasts two or three days. At the end of the seventh or eighth day there is a decided improvement, but this again only lasts for two or three days, when another exacerbation follows. These alternations of remission and exacerbation account for the mobility of the physical signs which Simon mentions. The inflammation abates at the spots first attacked to appear at others two or three days later. In this way this form of broncho-pneumonia generally lasts three to four weeks. In all forms of pneumonia the alteration in rhythm of respiration is noted at one time or another. Of the three forms of Cheyne-Stokes respiration, that one is probably most common in which the pause is followed by short, shallow respirations, gradually increasing in duration and depth, and then again gradually diminishing. There is no characteristic fever curve in the pneumonia of adults. Where the pneumonitis is extensive, the temperature is continuously high in the sthenic cases; but on autopsy we often find in weakly subjects very extensive consolidations, though the rise in temperature has been insignificant. Periods of great depression, coming on suddenly and departing just as suddenly, have been attributed to congestive attacks and collapse of limited and scattered areas of lung tissue. Simon<sup>55</sup> emphasizes the mobility of the signs of broncho-pneumonia. He says that one day you ascertain at one point all the characteristic signs and symptoms. In the evening or the next day you are surprised to find nothing here, but the same signs over a different area.

*Treatment.*—Dr. Proegler<sup>13</sup> recommends aromatic spirits of

ammonia as a good solvent. The drug is more uncertain in its action than antipyrine. The latter drug must be given in doses of from 2 to 5 grains in a child 3 years old. The fall in temperature continues for one or two hours, and the effects continue for one or two hours more. There is often a moisture of the general surface during the fall of temperature, and a general quieting effect. Most observers have advised giving some alcoholic with each dose, to avoid the depression sometimes noticed. Lately several cases of marked syncopal attacks have been reported from moderate doses, with no other explanation than idiosyncrasy. In the main, however, this is the safest and most reliable antipyretic we have at present. It should be continuously given to weakly children, or those having periods of great depression during the course of the pneumonitis.

Dr. Zinis,<sup>38</sup> of Athens, has advocated iodide of potash in the broncho-pneumonia of children,—claiming that it lowers the temperature  $1^{\circ}$  or  $2^{\circ}$ , diminishes the cough, calms the respiration and renders the expectoration easier. The effects are especially marked during the onset of the disease and in robust subjects, and are better in children over five years of age than in the younger. In 24 hours the quantity given may vary from 8–20 grains. The results should be produced in two or three days. It is only fair to add that the Doctor used dry cups and flying blisters coincidentally, but “attached little importance to their action.”

Steffan<sup>68</sup> says sulphate of thallin is especially valuable in broncho-pneumonia of children. The effect is seen in an hour; defervescence lasts 3–4 hours. The ordinary dose is  $\frac{3}{4}$ – $1\frac{3}{4}$  grains. Rarely more than two doses are required in 24 hours. The temperature is reduced from  $2^{\circ}$ – $4^{\circ}$ , its action varying with the individual. The pulse and respiration follow the temperature. The author has never seen collapse follow, though exceptionally the rise in temperature is succeeded by chills and cyanosis.

Dr. Ferreira<sup>68</sup> recommends highly the use of alcoholics in cachectic subjects attacked by pneumonia, broncho-pneumonia, and in fact all diseases where adynamic symptoms appear; also in cases of collapse, which do not fail to show themselves in such conditions. Young subjects tolerate alcoholics well, and no unpleasant sequelæ follow their careful and intelligent use. The writer cites Henoch, Barthez, West, Meigs and Pepper, and J. Simon as being most enthusiastic advocates of alcoholics in

depressed and adynamic conditions. He prefers to give it in the form of curaçoa, chartreuse, cognac, or malaga wine. They are generally called for during the later steps, but sometimes must be used from the very first. Pilocarpine has been recommended by Riess<sup>50</sup> after the acute stages, to favor absorption by liquefying the secretions, giving it hypodermically every day for one or two weeks. He had not observed any cardiac failure or phenomena of collapse from its use. He gave gr.  $\frac{1}{4}$  to a child 8-12 years old. Dr. Fowler<sup>13</sup> claims that calomel is the best and most agreeable cathartic for children, promoting dissolution of fibrinous formations, whether intestinal or membranous deposits on mucous surfaces.

#### PLEURISY.

Prof. Monti<sup>48</sup> showed in his clinic a little girl of 10, with evident dyspnoea and, according to his own examination, the apex displaced to the middle line, with absolute dullness and absence of respiratory sounds below the scapular spine on the left side, whom he wished still to be treated as an out-patient, telling the mother to keep her in bed and poultice her every two hours for a few days, and then bring her to see him again, when he would remove the fluid if it had not meanwhile decreased. Symptoms were of one week's duration. Such a case in England would be at once tapped or admitted and carefully watched.

When the effusion is purulent an early operation is desirable, as these products are in but the rarest cases absorbed. Unless symptoms of pressure are produced, we may wait, as suggested by Dr. Huber,<sup>13</sup> for 10 or 12 days, when the acute febrile condition, with its profound shock, will have subsided. Dr. Weber,<sup>19</sup> of Halle, operates on the sixth or eighth day, and generally before the fourteenth, to avoid bands and long compression of the lung. Serous collections may be removed best by aspiration, the only objection being that the fibrine cannot be removed in this way, and sometimes it exists in very considerable amounts. The small quantity of fluid not withdrawn will be absorbed.

Purulent products, on the other hand, if left to themselves, point somewhere on the abdominal or thoracic wall. Most of these cases terminate fatally, according to Wiederhofer.<sup>58</sup> They may be remarkably improved for a time by systematic irrigations; but in the great majority of cases better drainage must be secured

before a cure can be obtained. These collections should be treated as any other abscess: in recent cases by antiseptic incision; in older cases the pleural cavity must be systematically washed out also.

Dr. L. M. Holt has collected 80 cases of empyema treated by antiseptic incision, in which the duration of the discharge had been given. In 5 cases it was 4 months or over; in the remainder it averaged 6 weeks. In 21 cases, most of them of early operation, the duration was a month or less.

#### LOBAR PNEUMONIA IN CHILDREN.

Guaita<sup>86</sup> states that he found 45 cases of genuine croupous pneumonia in 130 cases observed. He bases his diagnosis first of all on the temperature, the acute onset, the quick rise and short course of 5 or 7 days, and the critical fall. No mention is made of confirmatory autopsies. In this variety the inflammation may invade a part of one lobe, all one lobe, or even the whole lung, and sometimes both lungs are involved. The line of demarkation is, however, sharp. There are no lobules in the midst of the consolidation which are not pneumonic, as we find in bronchopneumonia. The surface of the lung presents otherwise the same appearance. On section the surface is more granular, owing, probably, to the greater amount of fibrine present in these cases, which binds the alveolar contents into a firm plug. On the other hand, Dr. Moellmann<sup>50</sup> says he cannot find any connection between the meteorological condition and the frequency of pneumonia in observation on 944 cases of his own. Dr. R. Caspar,<sup>50</sup> also, after a study of 204 cases of the disease covering 5 years, found no meteorological condition explained the attacks or influenced their course. Moellmann notes the difference in the mortality in different years, which varied from 7.7 per cent. to 32 per cent., with an average of 15.1 per cent. He says a cold, wet year has similar results to those of a warm, dry one, and yet two similar years have different mortalities. He found 71½ per cent. of the cases occurred from December to June. He thinks "taking cold" is one of the principal predisposing causes of pneumonitis, but not an exciting cause, and that weather changes have more influence on the number of cases than any particular atmospheric condition, and adds that the weather during the preceding weeks should be noted, as pneumonitis seems to have an incubation period of a few days.

A series of investigations led Lecuyer<sup>78</sup> to the conclusion that unboiled milk of cows suffering from lung disease is liable to produce croupous pneumonia in human beings, the anatomical appearance of which is like that appearing in cattle. He gives the findings of two autopsies in proof of this. Children were taken sick while an epidemic of lung disease was prevailing among cattle in their vicinity.

*Diagnosis.*—Fournier quotes Parrot as denying the existence of lobar pneumonia in children under 2 years of age, and Damaschino and Cadet de Gassicourt as thinking it very rare and exceptional. He believes broncho-pneumonia may have the same violent initial stage as the croupous form. In these cases there are confluent foci. The diagnosis depends a great deal on whether the lesion is unilateral or not. He thinks the examination of the chest alone is not sufficient. The temperature record is of value. In broncho-pneumonia there is no definite type. The rise may be by degrees or at once. The decline may be equally sudden. There may be smaller rises and falls with renewed congestion.

Dr. Wm. Pepper<sup>37</sup> speaks of a case of croupous pneumonia, in a child  $3\frac{1}{2}$  years of age, with high temperature and convulsions, where, though repeated examinations were made, the diagnosis could not be settled for 3 days. No râles were heard before that time, when a fine crepitant râle appeared at the left base. Myers has recently seen a similar case in a boy of 5 years where there were no physical signs for  $4\frac{1}{2}$  days, when the crepitant râles appeared at the left apex posteriorly. There was a temperature of  $104^{\circ}$  F. from the first, and the onset was marked by convulsions.

*Prognosis.*—Schuyler<sup>33</sup> points out that the more extensive lesions and high fever occur in sthenic cases; that the prognosis is much better in sthenic than asthenic cases, the conclusion being that the more extensive process does not necessarily imply a more unfavorable prognosis. He claims that organic asthenia and the resulting functional insufficiency of some organ or organs is the cause of death in acute pneumonias in infants. It is the exception when death results in sthenic or uncomplicated cases. The greater mortality of females is explained by their lesser power of resistance. Eustace Smith also says the violence of the onset, the height of the fever, and the severity of the nervous symptoms are not in proportion to the extent of surface involved, nor do they indicate a prolonged course.



Dr. Moellmann says that of his 944 cases 10 per cent. were not the first attack. Two persons had as many as 5 attacks, 3 had 4, and 65 had 2 attacks. There seemed to be a certain predisposition to pneumonia in some cases, perhaps an auto-inoculation from the mouth. When the pneumonic process attacks an emphysematous lung, the capacity of the lungs to aerate the blood is lessened, according to the extent the pulmonary vesicular structure is impaired; and when they are further inhibited by the sudden development of the pneumonic process, the two causes favor a fatal apnœa; while the diminished extent of the capillaries in this affection lessen their capacity to carry on the circulation, which is still further diminished by the obstruction caused by the pneumonic exudate. This adds to the resistance to be met by the right heart, and promotes its exhaustion and functional failure. A pre-existing cardiac lesion would still further modify the prognosis. Albuminuria is seen in cases of pneumonia and also nephritis, though the latter is neither so frequent nor fatal in children as adults. Dr. A. Jacobi explains its occurrence by the high temperature and disturbed circulation, or perhaps by the simultaneous effect of the cause of infectious pneumonia on the lungs and kidneys. If the nephritis precede the pneumonia, the prognosis is much worse than in simple cases. The form occurring for the first time during or after the pneumonia is probably a much less serious matter.

*Treatment.*—Dr. Wm. Pepper<sup>37</sup> says it is impossible to over-estimate the advantage of meeting these violent onsets promptly. The continuance of excessive temperature for even a few hours will impart an added gravity to the case which may determine its future course in a fatal direction. Quinine and veratrum viride are too slow. The relative merits of the cool bath and antipyrine and antifebrine are not determined as yet. Where the hyperpyrexia is largely due to the poisoned state of the blood, the good results of the latter will often be transient. In such cases it is better to suspend their administration and try effect of cold water, and, if its effect be no more permanent, to abandon antiseptic treatment as perturbative and ineffectual. The cough, if distressing, may be relieved by small doses of opium, a few drops of the wine of ipecac, or a few grains of urethan. No depressing agents should be used, and blood-letting is indicated in the rarest instances only.

(T. H. M.)

## TUBERCULOSIS.

*Etiology.*—Froebeli<sup>5</sup> studied the records of the St. Petersburg Infant Asylum, and found that between the years 1874 and 1883 91,370 infants between one and four months old were there received; that 18,569 of them died, but only 4 per cent. from tuberculosis. He therefore concludes that tuberculosis is a rare disease in early infancy. The lungs were involved, however, in all the cases in which the disease existed at all. The bronchial glands, liver, spleen, intestines, brain and its membranes, kidneys, mesenteric glands, heart and pericardium, pleuræ, and upper air-passages were involved in more or fewer cases, and in the order of frequency mentioned. These statistics show that even in the earliest months of life tuberculosis from inhalation is much more frequent than the intestinal form, or that which is associated with alimentation.

Although Landouzy<sup>88</sup> has detected the tubercle bacilli in the vesiculæ seminales of male tubercular subjects without actual disease of these organs, and Curt Jani<sup>35</sup> has found them in the Fallopian tubes of a female dying from extensive pulmonary and intestinal tubercular lesions, there is not a single well authenticated case on record of this disease being present in the human fœtus. It therefore appears that if the disease is directly transmitted *in utero* by the parent to the offspring the bacilli must assume, in embryonic tissue, a form and condition which as yet has not been recognized or demonstrated. Blaine<sup>13</sup> and Creighton<sup>35</sup> argue hypothetically in favor of the theory of direct transmission, and base their conclusions upon the positive evidence which exists that bovine tuberculosis is in many instances transmitted directly to the embryo.

Convinced that the disease is inheritable, Landouzy<sup>88</sup> has zealously contributed details of no less than seven fatal cases of tuberculosis in infants ranging in age from six weeks to twelve months, during the first quarter of the year 1887, in all of whom he claims the disease was hereditary. His proofs, however, are not conclusive, and are controverted by many other observers.

Firket<sup>88</sup> is a firm opponent to the theory that tuberculosis is an hereditary affection. He claims that if the fœtus were infected through the maternal blood, the probabilities are that the lungs

would not suffer more than any other organ. He regards tuberculosis as a local disease of the lung, and explains secondary lesions, when they do occur, as apart from the general blood contamination.

Caudler<sup>89</sup> doubts even the capability of the bacilli in the blood of the tubercular mother to infect the fœtus. "In phthisis," he writes, "the irruption of the bacillus into the blood is the first scene of the last short act in its career as a parasite in the one host." Thus he claims hereditary tuberculosis to be a physical impossibility.

Gannett,<sup>12</sup> Minot,<sup>12</sup> Rotch,<sup>12</sup> Fitz White<sup>12</sup> and Bowditch<sup>12</sup> also report cases of this disease in very young infants, whose mothers or nurses were affected with tuberculosis. They do not regard these cases as confirming the theory that the disease is hereditary, as Landouzy has asserted, but ascribe the infection to be due to the ingestion of the contaminated milk. They believe it is more reasonable to admit acquired disease, the possibility of post-uterine infection through the milk of a tubercular mother or nurse, than to assume that during fœtal life the disease lies dormant.

It is vigorously contended by Blaine that not only the milk of tuberculous cows can transmit the virus, but also their flesh, if eaten, can likewise produce the disease. Klebs<sup>90</sup> adheres to the old assumption, and believes it to be the true one, namely, that the inheritance of tuberculosis is not an inheritance of the disease itself, but of a special proclivity or proneness to the disease. It is not the bacillus which is transmitted, but a soil fertile and suitable for the growth. Orth<sup>91</sup> also promulgates this doctrine, but emphasizes his belief in the theory that the disease is infective.

Lehman,<sup>92</sup> Eulenberg,<sup>92</sup> Hofmohl,<sup>92</sup> Weichselbaum,<sup>92</sup> all relate cases which they claim show positively that the disease can be contracted through the inoculation of the infecting bacilli; and Mueller,<sup>92</sup> desiring to investigate upon this subject more conclusively, injected tuberculous material into the arteries of animals, and obtained as the result of his experiments the formation of lesions in the bones of these animals similar to the tuberculous lesions which are found in the bones of tubercular subjects.

Notwithstanding many have disputed the liability of the skin

to be the primary seat of tubercular infection, Lesser<sup>25</sup> declares that it is liable, and he gives the details of an interesting case that came under his observation.

Treves,<sup>35</sup> although he believes the disease is infective, yet maintains that in a patient predisposed to tubercular disease, a simple injury may induce and localize the first manifestations of the trouble, and then slowly spread to other parts of the body. Thus in rabbits, which appear to be naturally predisposed to tubercular processes, he claims that the long retention of a simple seton may induce tubercular changes that in time generally become fatal.

In cases of ordinary pleurisy with effusion, Dunin<sup>93</sup> writes that there is good reason to suspect the tubercular diathesis, as tuberculosis so frequently follows as a sequel. Possessed with the same belief, Vickery<sup>12</sup> performed a series of experiments upon twenty-three animals, into whose peritoneal cavities he injected effused pleuritic fluid taken from an apparently non-tubercular patient. In ten of the animals he found evidence of positive tuberculosis, thus affirming, he says, the tubercular nature of the fluid used.

These observations seem to be akin to those of Treves,<sup>35</sup> and the deduction to be drawn is that in subjects predisposed to tuberculosis a simple lesion may be the initial local factor to cause active manifestations of the disease.

The relation of scrofula to tuberculosis still remains a subject of dispute. Both Airlong<sup>88</sup> and Ackland<sup>35</sup> testify to the difficulty of finding tubercle bacilli in chronic scrofulous lesions. Kent<sup>1</sup> holds that scrofula is identical with tuberculosis, being only separated by degree; and he regards the form of tubercle met with in so-called scrofulous disease as usually of elementary character.

Airlong considers the two diseases as identical, although he contributes the fact that, in reference to increase of virulence by propagation, a marked difference exists.

*Treatment.*—The treatment by rectal injections of sulphuretted hydrogen as a curative agent in this disease appears to be disapproved. Schultz,<sup>2</sup> Pepper,<sup>31</sup> Shattuck,<sup>31</sup> Jackson,<sup>31</sup> Solis-Cohen,<sup>31</sup> Bruen,<sup>31</sup> Wood,<sup>71</sup> Griffith<sup>31</sup> and Hassall<sup>35</sup> all give testimony not favorable to its use as a specific remedy.

Dettweiler,<sup>31</sup> Penzoldt,<sup>31</sup> Brehmer,<sup>31</sup> Thieme<sup>31</sup> and Haupt<sup>31</sup> are practically in unison with reference to treatment. They attach the greatest importance to life in the open air, and nourishing food. Milk to be taken in the interim between the meals, and light wines with the meals. (Sixth German Medical Congress, Wiesbaden.)

Antipyrine is recommended by the majority of German and French writers. Haines<sup>32</sup> gives to a child four to five years of age five to six decigrams daily, and Penzoldt<sup>32</sup> gives as many decigrams as the child has lived years, objecting to its use, however, if there is any cardiac adynamia. Huchard<sup>32</sup> and Dujardin-Beaumez<sup>32</sup> administer it in varying doses. Widowitz<sup>78</sup> prefers antifebrine in daily doses of two to five decigrams. Terebene is highly regarded by Decroizelles,<sup>68</sup> who has administered it to children with very satisfactory results. He gives to a young child three to four decigrams in twenty-four hours, and if necessary increases it to six decigrams, either in alcoholic form, pill, or watery solution, always advising that it be taken with the meals so as to avoid any internal disturbance.

In the Medical Congress at Moscow, Kremianski<sup>35</sup> first proposed aniline as a valuable remedy in tubercular affections, advising its use either internally or by inhalation. A committee appointed to investigate its merits as a remedy in this disease reported adversely; but both Reynolds<sup>35</sup> and Bertalero<sup>94</sup> claim astonishing results from its use.

Bertalero is so convinced of its remedial properties in this affection that he maintains it to be a specific remedy. It can be given to children in daily doses of ten to thirty centigrams internally, and of one grain by inhalation. When given in water, a few drops of alcohol should be added so as to render the aniline more soluble.

Kolischer<sup>95</sup> and Freund<sup>95</sup> have used the injection of concentrated solution of lime phosphate into tubercular deposits, and this method of treatment is also indorsed by Albert.<sup>95</sup>

The inhalation of atmosphere impregnated with the fumes of sulphur is the mode of treatment proposed by Sollaud.<sup>85</sup> Tannin in doses of 2-4 grams daily, as administered by Raymond and Arthaud, produced excellent results, both in children and adults, and they consider it a valuable remedy.

(B. G. C.)

## EXANTHEMATA—SCARLET FEVER.

*Etiology.*—The so-called “Hendon outbreak” has been the centre around which all the etiological investigations of the year, have revolved. In December, 1885, a sudden and extensive outbreak of scarlet fever in London was found to be associated with the distribution of milk coming from a dairy farm in Hendon. An investigation by the government failed to find any source of human contamination, but it was found that the cows were suffering from disease. This disease, Dr. Cameron,<sup>35</sup> medical officer of health for Hendon, describes as a specific contagious and infectious disease capable of being communicated to healthy cows by direct inoculation of the teats. It is also communicable to man. In the cow there is initiatory fever, cough, sore throat, discharges from the nostrils and eyes, eruption on the skin, vesicles on the teats, and visceral lesions. According to Thin,<sup>1</sup> it is a localized affection with three stages, viz.: (1) an erythematous stage; (2) a vesicular stage, lasting one or two days, when the vesicles burst, leaving the third stage; then a scab forms, gradually falls off, and the part heals. When communicated to man it causes general weakness, malaise, anorexia, followed in four or five days by the appearance of a vesicle. The part involved becomes swollen and painful. These symptoms disappear within fourteen days. Dr. Klein<sup>35</sup> studied the inoculability of the discharge from these ulcers on the teats. He inoculated four calves with satisfactory results. He also examined the secretions of the ulcers for micro-organisms, and succeeded in finding a micrococcus, with a cultivation of which he inoculated two calves; one died in twenty-seven days; no ulcers resulted, but the liver, kidneys and lungs were found to be congested. The second calf was killed, and similar changes were found. In neither case was an ulcer found, but the post-mortem appearance suggested the lesions of scarlet fever. From the blood of the heart the micrococcus inoculated was found. Hence Klein concluded that the micrococcus was the cause of the cow disease closely resembling scarlatina. Crookshank<sup>35</sup> experienced similar results; but he is convinced that the disease of the teats of the cattle is the true Jennerian cow-pox. He found a perfect vesicle on a boy's face, the lymph of which produced typical vaccinia in calves.

In the latter part of October, 1886, Dr. Edington, of Edin-

burgh, began to make investigations of the blood and epidermis in human scarlet fever. He succeeded in isolating a diplococcus *scarlatinæ sanguinis* and a bacillus *scarlatinæ*. The bacilli measure 1.2 micro-millimetre to 1.4 in length and .4 micro-millimetre in width. Inoculation of the bacilli produces in rabbits erythema and desquamation; in calves, fever and a rash, followed by desquamation. Dr. Edington<sup>35</sup> says the bacilli measure 2.5 to 4.5 micro-millimetres in length, and are found in the blood during the first two days only, in the desquamating epidermis only after the 21st day, and in the eighteen intermediate days they cannot be demonstrated in any of the tissues. (See colored plate in department of Pathology.)

Klein<sup>46</sup> is satisfied that the micrococcus found in the blood of human scarlet fever patients is identical morphologically with that obtained and cultivated from cows affected with a similar disease. He inoculated eight calves with cultivations of the micrococcus of human scarlet fever, and in all of them a disease was developed that seemed identical, both as to the cutaneous and the visceral lesions, with an affection produced in other calves by inoculation from the Hendon cows. He also inoculated and fed mice with micrococci from the Hendon cows and from human scarlet fever blood, and was able to produce the same pathological results. Dr. Edington's<sup>40</sup> brother, however, drank a cultivation of the streptococcus *rubiginosus* taken from scarlatinal blood on the fourth day of the disease, although he never had had scarlet fever and the streptococcus *rubiginosus* was found in his blood three days later; still, he experienced no evil effect. A committee of the Edinburgh Medico-Chirurgical Society examined 10 cases microscopically on or before the third day; bacilli and micrococci together were found in 3, micrococci alone in 4, and no micro-organisms in the other 3.

Dr. Edington's streptococcus *rubiginosus* cultivated from scarlet fever blood is very like Klein's micrococcus *scarlatinæ*, and Thin<sup>1</sup> has shown that both are very like the micrococcus *pyogenes aureus*. Thin acknowledges the existence of a pathogenic streptococcus; but he does not consider it proved that it is the cause of scarlatina, nor that the disease produced in animals by this coccus is scarlatina. Illingworth<sup>1</sup> is of the opinion that the infecting germs originate as the result of fermentative processes amongst animal and vegetable refuse. These germs are then inhaled and lodge upon the mucous membrane of the throat, where they excite

an inflammation and pass by absorption into the blood. According to Jamieson, the micro-organism flourishes well, even if dry. It grows abundantly, however, in milk, and also thrives in the presence of other organisms. It is probably allied to septicæmia, as indicated by the relation of scarlet fever to the puerperal state.

*Symptomatology.*—There is liability, according to Jamieson,<sup>35</sup> of confounding light cases with rōtheln. Here the condition of the tongue is the best guide. Ransome<sup>1</sup> quotes Cameron as authority for the statement that desquamation is seldom completed before the eighth week, and is by no means always completed in thirteen weeks. The period of incubation is brief, according to Jamieson,<sup>47</sup> rarely exceeding three days; when it lasts four, five or six days, it is delayed infection. In the latter case the poison is in the body, but outside the circulation. Once in the blood, evidences of constitutional disturbances of no ordinary type are very soon disclosed. These are vomiting, sore throat, rigors and eruption. The eruption may be so faint or transitory as to escape notice; but it is invariably preceded by sore throat. The contagium expends its force rapidly, and death may ensue even before the rash has become visible. Out of 200 cases reported, 11 reached their highest temperature on the first day, 76 on the second, 75 on the third, 36 on the fourth, and only 2 on the fifth day. When the highest temperature is reached after the fifth day, or if the temperature has not fallen considerably by that time, some complication is keeping it up. Desquamation begins at a varying period after subsidence of the rash, showing itself first on the tender skin at the sides of the neck, or more rarely between the fingers. It may begin on the fourth day, or the sixteenth day may be reached before it can be discovered. Nearly all cases beginning as late as the twelfth day are due to some pyrexial complication; and of these rheumatism is the most frequent. Desquamation is invariably present, and although more copious in those in whom the eruption has been most vivid, it does not bear an absolute relation thereto. It is especially well marked also on parts where there has been little or no visible eruption, as on the palms and soles and on the face.

Niven<sup>48</sup> speaks of a peculiarly sweet, almost aromatic odor of the breath, which is more marked in the early stages of the disease. Longhurst<sup>1</sup> thinks that the sick can infect the sound



within twenty-four hours of the first constitutional symptoms, and even before the appearance of the rash. The latter symptom is the outward expression of the full development of the poison in the system; and while this is being developed the breath is quite capable of conveying the disease to others.

*Complications.*—There is no doubt that the contagium of scarlet fever is capable of producing in the upper air-passages a diphtheritic exudation similar to that produced by diphtheritic poison. It can even produce the most severe diphtheritic inflammation, with necrosis of mucous membrane and formation of wounds, followed later by scar formation. This view is defended by Filatow,<sup>9</sup> of Moscow. According to him, scarlet fever angina offers a good nest for germs of diphtheria; and if the exudation comes before the eruption, or eight or ten days after it has disappeared, it is probably real diphtheria. The scarlatinal affection appears first on the third, fourth, or fifth day, rarely later than the sixth. It generally spares the larynx, and extends into the posterior nares. The cervical glands enlarge and suppurate. It is never followed by paralysis.

Dr. Jessner<sup>50</sup> had 118 cases under observation in one epidemic, 45 per cent. having a diphtheritic exudation in the throat which he called “angina necrotica scarlatinosa,” looking exactly like diphtheria. He claims that it gave rise to real diphtheria in some exposed who had already had scarlet fever. Filatow, on the contrary, says that even a light attack of scarlet fever will protect a person against an attack of this severe form during the epidemic. Le Gendre<sup>51</sup> agrees with Filatow. He says the angina may amount to a simple swelling or redness of the tonsils, or they may be covered with a soft, white, pultaceous, easily detachable deposit. Sometimes there is a pseudo-membranous deposit which covers the pharynx and isthmus of the œsophagus: in these cases the deposit never appears later than the third day. The membrane in non-diphtheritic cases varies with different epidemics. It may consist of thick folds or layers, or it may be a well-formed membrane. It is accompanied by pronounced dysphagia, swelling of the cervical glands, and diffuse infiltration of the cellular tissue of the neck. The discharge is seldom offensive and never gangrenous. It has a tendency to spread to the nasal fossæ and to the middle ear along the Eustachian tube. The consequent otitis is accompanied with

severe pain and perforation of the membrana tympani, and results in irremediable deafness. If true diphtheria complicates angina, it usually occurs during the second week. The prognosis is usually fatal, but is more favorable as the interval between the attacks becomes longer.

According to Jamieson,<sup>47</sup> enlargement of the cervical glands may be single or multiple: when single and implicating the parotid or submaxillary glands, it may end in suppuration; when multiple, involution is the rule.

According to Ashby,<sup>52</sup> there is a form of pericarditis accompanied by pleuritis and mediastinitis occurring in cases of pyæmia. These cases are mostly fatal, and are due to pus from broken down cervical glands forcing its way into the anterior mediastinum, and so producing suppurative pericarditis or empyema. In uncomplicated cases, pericarditis rarely occurs. He confirms, however, Litten's observation that a pericarditis sicca of short duration, without special symptoms, frequently occurs. 100 fatal uncomplicated cases were examined post-mortem, and not one showed a trace of either endo- or pericarditis. In several cases, however, abnormal, probably functional, murmurs were heard.

According to Jamieson,<sup>47</sup> rheumatism is one of the earliest complications. It affects the joints in the same manner as ordinary rheumatism, but the acid perspirations are absent or little marked. In one of his cases, peri- and in another endocarditis occurred. Jaccoud<sup>53</sup> relates a case where rheumatism came on during the fourth day: on the seventh, albumin was found in the urine. He considers rheumatism generally one of the late manifestations, but says it is frequently one of the earlier ones. Ashby<sup>52</sup> has occasionally seen a form of synovitis of doubtful rheumatic character, and never accompanied by endocarditis. It is fugitive, never attacking the same joint twice, and has a preference for the hands and feet. It generally begins on the seventh to the ninth day, and attacks those cases where from complications the temperature is high.

*Sequæ.*—Three forms of nephritis have been found by Graves<sup>55</sup> to be associated with scarlet fever: (1) catarrhal nephritis; (2) large, flabby, hæmorrhagic kidney; (3) acute glomerulonephritis. Catarrhal nephritis is met with in the first week of the disease, generally accompanying the eruption. It lasts from

a few days to a week, and then gradually disappears. It is rarely fatal. The urine shows a slight amount of albumin, hyaline casts, occasionally red and white blood corpuscles, renal epithelium and granular casts. There are rarely any symptoms pointing directly to kidney troubles. The large, flabby, hæmorrhagic kidney is quite rare,—Friedländer finding it only twelve times in two hundred and twenty-nine cases which he examined. It occurs between the first and fourth week, and runs a rapid course. In some cases the urine remains normal up to within twenty-four to forty-eight hours of death. Œdema rarely occurs; but when it does is generally found in those cases accompanied by extensive angina and diphtheritic inflammation. Acute glomerulo-nephritis is most frequent and most characteristic, appearing in the third or fourth week, when the patient is convalescent and the urine normal. It occurs very rarely in other diseases. The specific gravity of the urine is high; it is diminished in amount and contains albumin, epithelium, blood and hyaline casts. It may progress to recovery in a few weeks, or death from uræmia may ensue. Musatti combines milk diet with cold baths, with the best results in preventing nephritis.

Dr. Haze,<sup>55</sup> in a report on scarlet fever cases in the Elizabeth Children's Hospital in St. Petersburg, says that only 13.1 per cent. suffered from nephritis during the last year. The average for the years 1871–1886 was 15.7 per cent. Jacobowitsch<sup>56</sup> reports 5 fatal cases of scarlatinal nephritis where the urine was normal in amount or even exceeded the normal, and the specific gravity was also normal. He considers œdema of the brain as the cause of death in these cases, due to the hydræmic condition of the blood, and to disease of the vessel walls induced by the scarlatinal poison.

Illingworth<sup>1</sup> says that dropsy, the most usual of the sequelæ, is due to a watery condition of the blood from the loss of fibrine and hæmoglobin. Here iron is the sheet anchor, and jalap has a wonderful effect in freeing the blood of the superficial watery elements. If convulsions ensue he advises venesection up to four or five ounces. A child of 4 or 5 years took 9 ounces with good effect. Leyden<sup>57</sup> has reported a case of death from small contracted kidney following a nephritis scarlatinosa three years earlier in a man 29 years old.

Ashby,<sup>52</sup> taking nine hundred hospital cases seen in five years

as a basis, attempts to ascertain the relationship between scarlet fever and heart affections. He finds that endocarditis is not rare in the nephritic cases. One of the best clinical symptoms of it is the appearance during convalescence of hemiplegia due to emboli. Dilatation and hypertrophy without valvular involvement occur occasionally, but never to any great extent unless there are complications. When the blood pressure is increased, as in nephritis, the walls of the heart yield and all the cavities are dilated. In very severe cases of nephritis, dilatation can take place very quickly. He relates one case where the dilatation disappeared after the nephritis was cured; also two fatal cases where death was due to insufficient nutrition of the heart by the uræmic and anæmic blood.

According to Batut,<sup>28</sup> statistics in Belgium show that out of 1892 cases of deafness, 216 followed scarlet fever. Another observer found 144 out of 400 cases due to the same cause. The aural complications are due to the extension of the inflammation from the throat up the Eustachian tube into the middle ear: this causes either temporary or permanent deafness.

*Treatment.*—Illingworth<sup>1</sup> claims that biniodide of mercury is a specific. Clement Dukes<sup>1</sup> gives it in doses varying from  $\frac{1}{4}$ — $\frac{1}{2}$  grain every four hours, and continues it several days. It arrests fever, and almost entirely prevents desquamation. Still, Dukes says that there is danger of mercurialization in those destined to have a nephritis. Ashby<sup>49</sup> concludes, after an exhaustive review of the subject, that patients may be discharged at the end of the sixth week, although it is better to keep them until the eighth. Cases presenting glandular complications and the like should be detained until full recovery. The Glasgow Fever Hospital and Western Fever Hospital in London fix on eight weeks as a minimum period of stay, and allow no patient to go who shows a trace of desquamation anywhere. The throat should be carefully examined, and no patient showing any marked enlargement of tonsils or unusual redness of fauces should be allowed to return home.

There is a difference of opinion as to the use of inunctions. Jamieson<sup>1</sup> uses the following salve: R resorcin, 1; lanolin, 6; ol. sesami, 2. This is rubbed into the skin to hasten desquamation and so anticipate the rise of the specific organism through the skin. He advises washing the hair and scalp with carbolic lotions, as the hair is a dangerous source of infection. Brown<sup>1</sup>

uses 5 per cent. carbolized oil inunctions all over the body except on the face, where olive oil is used. This is done twice daily for four or six weeks, followed by a warm bath at night. He claims that the danger of sequelæ is thus averted. Long<sup>35</sup> anoints with carbolized inunctions, and gives a daily bath as soon as the patient's condition will permit. Wigglesworth<sup>35</sup> uses carbolic acid internally, rendered liquid by the addition of 10 per cent. of water. He gives  $\pi ij-vj$  every two hours, day and night, during the first three days. If the patient is then doing well, it is given every three hours for four or five days; then every four hours until all danger is passed; then t. i. d. until the patient is convalescent.  $\pi viij$  has been the maximum dose, and beyond that it would not be safe to go, as nausea, griping and diarrhœa resulted even from that dose. In twenty-four or thirty-six hours the urine becomes smoky, and in time almost black. Wigglesworth never considers a patient safe until this hue is obtained, and the deeper it is the better. He gives  $\pi j$  t. i. d. to everybody in the house, and does not isolate the patient. Under this treatment he has had only four cases where the disease was taken, and then only slightly.

Expectant treatment<sup>35</sup> gives the best results. When the throat is affected and the glands are enlarged, gargles are beneficial, especially antiseptic ones, together with moist compresses. Iodine dissolved in resorcin and painted on the enlarged glands every three or four hours, gives relief: this should be begun when the least enlargement is noted. The nostrils should be kept clean. For cerebral symptoms nothing is better than cold locally applied. Bleeding is seldom resorted to. Aconite in small, frequent doses is used by many. A full bath is not much used, but the sponge bath is. Dukes advises the bath at a temperature of 100°–101° F.

For the throat, carbolic acid in glycerine 1–20 is painted on twice daily by Illingworth. Internally, he gives diaphoretics and iron with potass. chlorat. A saturated solution of boroglyceride in glycerine combined with weak mouth washes of potass. perman. are used by Dukes. He envelops the neck in cotton-wool, and applies iodine or potass. iodide in lanolin. Guttman, however, thinks lanolin here is in no way preferable to lard. In the rheumatic complications salicin acts better than the salicylates.

Comstock<sup>37</sup> recommends stimulants from the onset in malignant cases in connection with the wet sheet. (F. H. D.)

## RUBEOLA—MEASLES.

*Etiology.*—This eruptive fever is contagious from the commencement of the prodromata, according to Ollivier.<sup>59</sup> Michael<sup>60</sup> relates a case which was inoculated by opening a small pustule with a needle borrowed from a girl who sickened the following day of measles.

Cameron<sup>35</sup> reports two epidemics of measles which resulted in a high rate of mortality, coinciding with high barometric pressure, increased temperature, considerable variation of day and night temperature, and scarcity of rain.

*Symptoms.*—According to Raven,<sup>61</sup> the period of incubation is from twelve to fourteen days, and the extreme duration of infection is reached three weeks after the date of the beginning of the eruption.

Haig Brown<sup>1</sup> gives fourteen days as the length of the period of incubation.

Sevestre<sup>11</sup> says there is a period of from thirteen to fourteen days between the infectious contact and the eruption, and nine days between the contact and the beginning of the period of invasion.

*Complications and Sequelæ.*—Barbier<sup>61</sup> has observed that in measles the larynx is liable to become affected at all stages of the disease. After the period of eruption a particularly grave form may appear leading to suppuration and threatening asphyxia. The lesion consists of an intense inflammation with purulent exudation, ulceration of the mucous membrane or perilaryngeal abscess, but no false membrane.

The following complications as reported by Haig Brown,<sup>1</sup> Northrup,<sup>13</sup> Simon,<sup>62</sup> Browning,<sup>13</sup> Baratoux,<sup>11</sup> are important to note: bronchitis, stomatitis, pneumonia, follicular tonsilitis, anuria, mastoid abscess, otitis.

Grancher<sup>51</sup> is of the opinion that broncho-pneumonia and diphtheria are the most common complications under 2 years of age, and are the most fatal.

Barlow<sup>59</sup> had a case of acute diffuse megalitis complicating measles on the fifth day of eruption.

Fox<sup>35</sup> relates two cases, brother and sister, in whom a curious nervous affection followed measles, resulting fatally in one case.

Collins<sup>7</sup> mentions two cases of chorea, also observed in a recent epidemic. Simon<sup>62</sup> likewise mentions this as a complication.

Grancher<sup>51</sup> believes that tuberculosis frequently follows measles, and many observers agree with this view; but the facts do not bear out the assertion.

Mayland<sup>63</sup> relates a case of infantile paralysis of right upper extremity following measles. Jeunhomme<sup>64</sup> gives an account of a case of thrombosis of the left middle cerebral artery in a convalescent.

Endocarditis on the fourth day of the eruption was observed by de La Bate.<sup>65</sup>

Annesly<sup>28</sup> reports a case of paraplegia in a young man during convalescence; this is very rare, and was probably due to the direct poisonous effect of the microbe on the substance of the spinal cord itself.

Grancher<sup>51</sup> calls special attention to the fact that phlyctenular conjunctivitis and corneal ulcer may occur, chiefly during convalescence.

*Treatment.*—Cohn<sup>62</sup> treated 100 cases of measles by warm-water baths, with eight deaths. Each patient received six baths daily, ranging from 28° to 30° R., occupying from eight to ten minutes, immersion up to the neck, with cold water douches on head. The temperature was rapidly abated and there was abundant perspiration and easier respiration.

Grancher<sup>51</sup> treats the complicating otitis by irrigation of the ears from two to six times daily with warm carbolized or borated water. The ears are then dried carefully and insufflated with alum, borax or iodoform. When keratitis exists, with conjunctivitis, the applications should consist of warm boric acid solutions; in simple conjunctivitis, cold applications. Should perforation of the cornea seem imminent, he uses aq. destil., 10; eserine salicyl., .05.—M.

For acute blepharitis, Grancher uses compresses wet with a warm solution of boric acid, and applies to the borders of the eyelids morning and evening the following: R̄ vaselini, 10; hyd. ox. flav., .50.—M.

If it develops into chronic eczema, warm poultices made antiseptic with boric acid should be then applied; also vaselini, 5; zinci oxid., .50.

## RÖTHELN—GERMAN MEASLES.

*Etiology.*—Atkinson<sup>66</sup> and Love<sup>7</sup> agree that this is an infectious and feebly contagious malady. According to the former, the infection lasts two or three weeks; and the latter, about a month. There is much difference of opinion regarding the relationship of this disease to measles and scarlatina. Klaatsch<sup>9</sup> says that fully half of the cases observed by him in two epidemics of rötheln were preceded by measles or scarlatina. Christiansen<sup>7</sup> says it is usually found together with epidemics of measles and scarlatina. Atkinson<sup>66</sup> says that no immunity is afforded by an attack of rötheln against measles and scarlatina, and *vice versa*. It mostly occurs in infancy and childhood, but has been observed in adults. Atkinson<sup>1</sup> gives the case of a woman aged 70 years affected by it.

*Pathological Anatomy.*—Rötheln presents a characteristic eruption,—the appearance of which is compared by Atkinson to that obtained by touching white blotting paper with a pen which has been dipped into red ink,—each minute spot surrounded by an areola. Sometimes they are of considerable size: they are rarely discrete: papules containing a seropurulent liquid may form. Griffith<sup>13</sup> and Atkinson<sup>66</sup> have noticed faint yellow or brownish spots remaining after the rash has disappeared.

*Symptoms.*—Haig Brown,<sup>1</sup> in a report of an epidemic, observed that the period of incubation in a large majority of the cases was from nine to fourteen days. Atkinson gives from one to three weeks as the length of this period. Willcocks and Carpenter<sup>67</sup> say it varies from five to seventeen days. The same observers give the period of invasion as varying greatly,—in some cases the eruption being the first symptom noticed, and in others the period lasting a week. The affection is of varying intensity. There may be slight prodromata, malaise, loss of appetite, pain in limbs, headache, sometimes nausea and vomiting, occasionally convulsions (in very young children); the conjunctiva becomes injected and the naso-pharynx also involved. Griffith<sup>13</sup> says that the catarrhal symptoms occur in about one-half the number of cases; and Haig Brown,<sup>1</sup> in two-thirds. All recent authors insist upon the enlargement of the lymphatic glands behind the ear and back of the sterno-cleido-mastoid as a most characteristic symptom. Atkinson says the eruptive period is from twelve to twenty-four



hours' duration, and that it subsides in from one to four days. Willcocks and Carpenter agree. According to the latter, eruption appears first on the face at margin of hair, spreading thence over the trunk and extremities. This agrees with Atkinson's observations; while Haig Brown describes it as beginning on the chest, and as strongly resembling measles, only less dusky.

Temperature has been generally observed rarely to go above 100°, in exceptional cases 98°, and again 105° (Haig Brown). The desquamation may be entirely absent or slightly branny.

*Complications and Sequelæ.*—Most frequent are conjunctivitis, naso-pharyngeal catarrh, bronchitis, pneumonia, cervical adenitis. Follicular tonsillitis and cerebral congestion may occur.

*Diagnosis.*—Formerly all affections having a red macular eruption, not recognized as measles or scarlatina, were described as rōtheln, naturally resulting in great confusion. The eruption is the main point of difference between scarlatina and rōtheln. The diagnosis between measles and rōtheln is more difficult. The pharyngeal congestion has been suggested by Atkinson<sup>66</sup> as of great importance, together with the characteristic swelling of the glands about the head and neck.

*Treatment.*—As advised by Love,<sup>7</sup> proper rest, isolation, personal disinfection by means of lotions or unguents containing some germicide, and treatment of the complications as they arise, are the indications.

#### VARICELLA—CHICKEN POX.

*Etiology.*—This is a contagious and, according to Hutchinson<sup>1</sup> and Le Gendre,<sup>51</sup> an inoculable affection. Bruyelle,<sup>68</sup> as the result of the study of two epidemics of variola and varicella occurring simultaneously, is of the opinion that the variolar poison, attaching itself to a more or less receptive organism, produces either one form or other, attenuated or not, of the affection, viz.: variola, varioloid, or varicella. Le Gendre entirely dissents from this theory.

*Pathological Anatomy.*—Grancher<sup>62</sup> describes the eruption as consisting of vesicles on red bases, their walls containing a translucent fluid. The appearance of each vesicle is that of a little drop of wax.

*Symptoms.*—The affection is ushered in by a slight elevation of temperature after scarcely any prodromata, together with an

eruption of vesicles on the trunk. Comby<sup>68</sup> has found in his cases vesicles usually present on the bucco-pharyngeal, conjunctival, and vulvar mucous membranes. The vesicles occur in successive crops, so that we have present on the body, the eruption in all stages, numerous roseola spots, interspersed with recent vesicles, and those which have dried up and are dropping off. Hutchinson says that it may take on a hæmorrhagic form; and although the affection is usually benign, he has had fatal results from complications.

*Sequelæ.*—These are, in many cases, according to Hutchinson and Le Gendre, broncho-pneumonia and parenchymatous nephritis, the latter occurring from the 15th to the 21st day. Comby admits that the above complications may occur, but denies the frequency of them, and cites the histories of ten cases of his own to prove that stomatitis, keratitis, conjunctivitis, and vulvitis are the most frequent sequelæ. Bellamy<sup>36</sup> reports a case of Reynaud's disease following varicella with death on the fourth day.

*Diagnosis.*—In *urticaria*, according to Comby, you may have papules surmounted by transparent vesicles, which never occurs in true varicella. They may be surrounded by a red areola, but never have a papular base. The writer had a case of *pemphigus*, consisting of round transparent vesicles on a red base, but confined to the face and neck, which appeared after prodromata of two days. The child was apparently very ill. In two more days, veritable pemphigus bullæ displaced the vesicles. Hutchinson<sup>1</sup> describes a chronic affection called *prurigo varicelliforme*, which Comby<sup>68</sup> considers to be identical with *vesicular urticaria*. It consists of crops of vesicles and bullæ, appearing from time to time without prodromata, accompanied by intense itching. The larger vesicles become broken and cause deep ulcers. This affection occurs chiefly on the flexor sides of the articulations and on the palmar and plantar surfaces of the extremities. *Syphilides varicelliforme* may offer some difficulty as to diagnoses from varicella; but this is rendered easy by the existence of papules and other syphilitic manifestations. It occurs secondarily, generally around the sixth month, never after a year. *Pemphigus* may be differentiated by the size of the bullæ alone.

*Treatment.*—Comby<sup>68</sup> advises for conjunctivitis and keratitis, nitrate of silver and sulphate of zinc; for the stomatitis, chlorate of potash; and for the vulvitis, emollient lotions. (F. M. W.)

## PAROTITIS—MUMPS.

*Etiology*.—In a report on unusual metastasis of mumps, Dr. F. D. Haldeman<sup>69</sup> refers to the investigations of Ollivier, who confirms the observations of Capelan and Charin on the presence of peculiarly shaped micrococci in the blood and urine of patients suffering from mumps. That the disease may be communicated by mediate as well as immediate transmission has been established by Roth,<sup>12</sup> who has carefully noted 1 case by actual contact, 1 transmitted by the physician, and 1 by the use of the fumigated bedding formerly occupied by a patient suffering from mumps. Acute endometritis is reported by Greenwood<sup>1</sup> as a cause of inflammation of the right parotid, and an operation for imperforate anus as another cause by Taylor.<sup>1</sup> These cases are referred to here simply because they involve the parotid gland and are useful in a differential diagnosis. Holman<sup>70</sup> details a case of acute jaundice resulting from malarial toxæmia, as a cause of suppurating parotitis which discharged 4 to 6 quarts of pus in three weeks. Paget<sup>1</sup> refers to the etiological connection of disease and injury of the pelvic organs with parotitis. The incubative period of mumps has been clearly established by Roth<sup>12</sup> as 18 days.

*Symptoms*.—An interesting error in diagnosis which came near resulting fatally to the patient is mentioned by Haldeman,<sup>69</sup> a testicle atrophied by mumps being overlooked, and a strangulated hernia on the same side being mistaken for an undescended testicle.

*Prognosis*.—Haldeman gives an account of 3 fatal cases, 1 of undiagnosed pulmonary disease with suppression of urine; 1 of abscess of liver opening into the right lung, preceded by abscess of the right thigh. Both cases were suffering from mumps, complicated by orchitis, when the fatal illness ensued. A third fatal case is cited of a pregnant woman in whom the parotid swelling subsided on sixth day, when labor pains commenced and a 7 months' fœtus was expelled. Expulsion of placenta followed by an offensive discharge. Patient became delirious and died in two days.

Among the sequelæ of mumps may now be added, on the authority of M. Joffroy,<sup>35</sup> peripheral neuritis; paralysis affecting all free extremities; deep reflexes being abolished, muscles giving reaction of degeneration. These symptoms set in three weeks after an attack of mumps, and lasted four months.

## DISEASES OF THE LIVER.

*Painless enlargements* of the liver connected with or preceded by tuberculosis is regarded by Starr<sup>71</sup> as common among the hepatic troubles of children. Excessive injections of farinaceous food may cause a deposit of fat in the liver cells; but on the other hand chronic wasting diseases, tubercle, rickets, caries of bone, chronic intestinal catarrh, scrofula and syphilis may induce an absorption of fat from the subcutaneous and other fat deposits. Symptoms are not reliable except in well developed cases. Fatty liver may be diagnosed by the soft, blunt edge of its outline and by the absence of enlargement of the spleen, of ascites and jaundice. From amyloid liver Starr distinguishes it by the latter being harder and often extending much lower down, by its edge being sharper and more prominent. The amyloid form is accompanied by enlarged spleen, by albumin, characteristic casts in urine, œdema, and coexistence of some exhausting disease. Jaundice and ascites may be found in both forms, due to pressure in the hepatic fissure; in the fatty form by caseous or tubercular enlargements, in the other by amyloid deposits. Prognosis is favorable when due to the excessive use of farinaceous food; unfavorable when result of pathological processes. Treatment consists in removing the cause producing the condition, regulation of diet, improvement of hygienic surroundings, care of the general health. In the syphilitic form of amyloid liver, iodide of potassium is of value.

*Cirrhosis*.—This is a rare affection in children, Dr. Palmer Howard<sup>66</sup> having collected 61 cases in the literature of the subject and reporting 2 striking cases from his own practice. A girl 9 years old was fretful, weak and lost appetite; liver extending one and a half inches below ribs, spleen enlarged, skin and conjunctives jaundiced, pulse 114, temperature 103.8°. Epistaxis frequent; in latter stage, hæmaturia. Ascites occurred in second month, nine pints being evacuated in two tapplings. Child lived four months. Post-mortem evidence of cirrhosis was clear. A brother of this child succumbed to a similar attack, autopsy revealing typical hob-nail liver. No syphilitic or other taint found. Among the 61 cases, 10 were traced to alcohol, 7 to syphilis; in one-half the cases no cause discovered except defective diet; largest number occurred between ages of 9 and 12; twice as many among males as females.

## INFANTILE DIARRHŒA.

*Etiology.*—The study of this subject has received important impulse during the past year by the exact investigations of E. W. Hope,<sup>72</sup> Medical Officer of Health in Liverpool, who has critically analyzed 1000 fatal cases of infantile diarrhœa. The disease is shown to be specific in its origin and nature by Hagens<sup>28</sup> and Lesage,<sup>28</sup> and this view is confirmed independently by Hope. The latter dwells on the fact that the mortality of the disease has, like that of fever, been steadily reduced, chiefly by the improvement in the dwellings of the poor. It occurs most frequently among the laboring dock population, many of whom live in extremely unsanitary conditions. It occurs principally in autumn, when the ground water is low. In the larger proportion of cases the attack is sudden and of brief duration, other persons in the same family being similarly attacked. Death is frequently ushered in by convulsions indicating toxæmia. Hope brings out the fact that while the mode of feeding is the same throughout the year, the summer and autumn seasons favor decomposition. The putrefactive changes in the food rather than the food itself act, as Holt<sup>55</sup> also claims, deleteriously. Among 1000 deaths, only 30 occurred in breast-fed infants, 393 received no breast milk at all, 287 had a mixed natural and artificial diet. Upward of 50 per cent. were nursed until 3 months old; 20 per cent. began feeding from 3 to 6 months; after 6 months artificial food was always added to the breast milk. These data are reliable; the conclusions are therefore of great value. Every exclusively nursed infant under 3 months succumbed to diarrhœa; 15 died among the artificially or part breast-fed; among infants entirely sustained by artificial food, the mortality was 22 times larger than among an equal number of the nursed or partly nursed. For every infant from 3 to 6 months receiving some breast milk, six died who received no breast milk. The conclusion is patent that weaning should be deferred to the non-diarrhœal months. Dentition is probably also a predisposing cause. The communicability of the disease seems highly probable. In 244 out of 1000 cases recorded, other children were affected in the same families. Hagens<sup>28</sup> found that one case of green stool diarrhœa in his hospital would often be the precursor of an epidemic.

Holt<sup>55</sup> makes improper hygienic surroundings one of three etiological elements, the others being improper or artificial feeding and excessive heat, all of which he claims produce, as Baginsky has shown, dyspeptic conditions which cause the diarrhœa. The ptomaines from food are charged as bearing a large share in the production of diarrhœa by Hope and Holt, and tyrotoxicon by Le Gendre,<sup>28</sup> and Vaughn.<sup>31</sup>

Holt<sup>55</sup> regards the nervous symptoms in infantile diarrhœa as due to absorption of ptomaines, and the inflammatory changes as caused by the diarrhœa, rather than causing it, because these changes are chiefly found in the cæcum and sigmoid flexure, where material is mostly retained. Schoppe<sup>28</sup> claims that the large serous discharges induce a shock; fermentation produces a transient paralysis of the splanchnic nerves, causing a plethora of the abdominal viscera.

*Treatment.*—The influence of the parasitic theory and the recognition of ptomaines and fermentative changes in the production and maintenance of infantile diarrhœa naturally lead to the administration of antiparasitic and antifermentative remedies. Sterilizing the milk if artificial, but preference of breast milk, is the first object enforced by Le Gendre.<sup>28</sup> He prefers to render the intestinal canal aseptic by copious enemata of naphthol,  $5\frac{1}{2}$  gr. to 2 pints water. Herein Holt<sup>55</sup> agrees with him, recommending weak solution of benzoate or salicylate of sodium; if astringents are needed, of nitrate of silver or tannin. The entire large bowel should be reached; for a child six months old, 1 pint; for older children 2 pints will reach the ileo-cæcal valve, while the abdomen is being manipulated gently. Clearing out the bowels by castor oil is an old-fashioned remedy, emphasized by Holt. Internally he gives salicylate sodium and naphthol. The latter is valued by Lunin<sup>28</sup> and Widowitz, given in small and frequently repeated doses. Hagens,<sup>28</sup> regarding the green stools as contagious, orders their removal and immersion in a 1 to 1000 solution of corrosive sublimate. He administers a teaspoonful of a 2 per cent. solution of lactic acid an hour after feeding; for which he claims a rapid improvement of the vomiting and of the character of the stools. Schoppe<sup>28</sup> relieves the shock due to plethora of the abdominal viscera by means of wet sheet packing, renewed every two or three hours. In collapse he resorts to mustard baths.

## ENURESIS.

The etiology and treatment of this trying infirmity has received exhaustive discussion from Drs. Alexander Harkin<sup>73</sup> and Samuel Adams.<sup>74</sup> The practice of either neglecting these cases as beyond relief or resorting to barbarous measures, including corporal punishment, is dwelt upon by both authors; and it must be borne in mind by practitioners that the ideas entertained by laymen on the subject are to be severely criticised. Adams brings out the psychical influence of this affection upon boys. They become morose, more or less depressed, spiteful and restless; they look pale and haggard; their mental and physical conditions resemble that resulting from onanism. Three varieties are to be distinguished: one infrequent, in which there is almost constant daily and nocturnal dribbling of urine, and which is usually associated with some pathological lesion; a second, intermittent type, occurring night and day, in which the child is unable to resist or await the emptying of the bladder; and a third, the most frequent and most tractable form, occurring only at night. The latter usually dream of the act. In some of these cases the wetting is due to the same causes which sometimes produce seminal emissions in the adult,—as late meals, etc.,—and cease when emissions begin later in life. Harkin, referring to Claude Bernard's discovery of the influence of the nervous system in urination, presents an elaborate exposition of this subject, and quotes Michael Foster, Eckard, Erb, Mosso and Pellicani to sustain his position. He is satisfied that, while the act of micturition is under the direct influence of the urinary centre in the lumbar portion of the cord, there is a higher reflex centre also to be sought in the fourth ventricle and medulla oblongata.

According to Foster, incontinence of urine in children is really an easily and frequently repeated reflex micturition which, according to Harkin, is probably due to some form of congestion of the medulla.

On the other hand, Adams endeavors to demonstrate by elaborate anatomical argument, the close relation between the spinal and the sympathetic nerve filaments of the penis and the bladder. Through the instrumentality of the bladder an irritation of the former should excite reflex action of the latter.

*Treatment.*—In accordance with the congestion theory, Harkin<sup>73</sup> recommends with much warmth the application of a blister three inches long and two inches wide, made by the linimentum cantharides, over the nape of the neck, as high up as possible. He supports his recommendation by what certainly may be regarded as remarkable results obtained in a female orphanage, and he cites several interesting clinical histories of severe cases. Adams<sup>74</sup> advises circumcision, especially in the third class referred to above, as a measure for the removal of the irritation of the penis, to which he is disposed to ascribe the reflex contractions of the bladder in many of these cases. Many successful results and but one failure are brought forward as evidence of the value of early operation. He also advises tr. nux vomica and fl. ext. ergot combined, and in some cases he resorts to atropia. (S. B.)

#### INTUBATION.

A large number of interesting articles have been presented during the year upon this subject, not alone from the pens of American writers, but an increasing number of foreign reviews have appeared, with here and there a case in which the operation was practiced. In Spain, our Corresponding Editor, Dr. Ramon de la Sota, reported a successful case of his own, the first in that country. Several were reported in England by Durham,<sup>35</sup> Shingleton Smith<sup>35</sup> and Waldo,<sup>35</sup> while others were reported in France, Italy and Germany,—very evident indications that the device is becoming more and more thought of abroad. Stoerk,<sup>43</sup> of Vienna, also spoke favorably of the operation, and presented modified instruments of his invention calculated to facilitate manipulation. O'Dwyer's instruments have been modified by Hoadley,<sup>69</sup> Thilo,<sup>50</sup> Sajous,<sup>33</sup> Waxham,<sup>96</sup> Tascher,<sup>44</sup> and Denhard.<sup>13</sup>

Hoadley, of Chicago, modified the tubes by shortening them and making the head cup-shaped, so as to facilitate extraction. The head being smaller, the instrument enters deeper into the glottis, thus facilitating the motion of the epiglottis and its functions. Waxham, of Chicago, tried to prevent the entrance of food, etc., into the tube by attaching an artificial epiglottis to an india-rubber collar, the latter in turn rendering retention of the tube *in situ* more probable. This device will probably become a valuable one.



In an interesting article published in the *New York Medical Journal*, Dr. O'Dwyer presents an analysis of 50 cases of croup

## ANALYSIS OF FIFTY CASES TREATED BY INTUBATION.

| NO. | DATE.         | SEX. | AGE. | DURATION, BEFORE INTUBATION, OF— |                         | URINE.     | CAUSE OF DEATH.   | RESULT.                           |
|-----|---------------|------|------|----------------------------------|-------------------------|------------|---|-----------------------------------|
|     |               |      |      | CROUP.                           | PHARYN-GEAL DIPHTHERIA. |            |   |                                   |
| 51  | 1886.<br>Dec. | F.   | 9 0  | 2 d.                             | 10 d.                   | Not exam.  | Inanition, paralysis.....                                   | Died 3 w. after removal of tube.  |
| 52  | "             | M.   | 3 3  | 1 d.                             | Present.                | No albumin | Exten. to bronchi.....                                      | Died 3 d. 21 h. after intubation. |
| 53  | 1887.<br>Jan. | F.   | 6 5  | 1½ d.                            | "                       | Not exam.  | " " " " " " " " " " " "                                     | Died 5 d. 2 h. " "                |
| 54  | "             | M.   | 3 5  | 1 d.                             | "                       | Albumin.   | Not known. " " " " " " " " " " " "                          | Died 4 d. 14 h. " "               |
| 55  | "             | F.   | 3 4  | 1 d.                             | "                       | "          | { Sepsis—a hopeless, septic case..... }                     | Died 17 h. " "                    |
| 56  | "             | M.   | 4½   | 3 d.                             | "                       | "          | Pneumonia.....  | Died 9 d. " "                     |
| 57  | "             | F.   | 2 10 | 1½ d.                            | "                       | "          | Exten. to bronchi.....                                      | Died 1 d. 4 h. " "                |
| 58  | "             | M.   | 3½   | 1 d.                             | "                       | Not exam.  | { Pneumonia—Extensive }<br>pneumonia, measles.. }           | Died 62 h. " "                    |
| 59  | Feb.          | M.   | 4½   | 1½ d.                            | None.                   | "          | Exten. to bronchi.....                                      | Died 16½ h. " "                   |
| 60  | "             | F.   | 2½   | 15 h.                            | 3 d.                    | "          | " " " " " " " " " " " "                                     | Died 3 d. 21 h. " "               |
| 61  | "             | M.   | 2 8  | 4 d.                             | 5 d.                    | Albumin.   | Pneumonia.....  | Died 9 d. " "                     |
| 62  | March.        | M.   | 3½   | 3 d.                             | 6 d.                    | "          | " " " " " " " " " " " "                                     | Recovered; wore tube 1 d. 1 h.    |
| 63  | "             | F.   | 2½   | 1 d.                             | None.                   | Not exam.  | Exten. to bronchi.....                                      | Died 1 d. after intubation.       |
| 64  | "             | F.   | 5    | 2 d.                             | "                       | Albumin.   | " " " " " " " " " " " "                                     | Recovered; wore tube 6 d.         |
| 65  | "             | M.   | 0 18 | 1½ d.                            | 4 d.                    | No albumin | " " " " " " " " " " " "                                     | Recovered; wore tube 4 d. 4 h.    |
| 66  | "             | F.   | 0 4  | 2 d.                             | 7 d.                    | Not exam.  | Broncho-pneumonia.....                                      | Died 1 d. 16 h. after intubation. |
| 67  | "             | F.   | 8 9  | 4 d.                             | 7 d.                    | "          | Exhaustion.....   | Died 1½ d. after intubation.      |
| 68  | "             | M.   | 3 7  | 2 w.                             | 2 w.                    | No albumin | " " " " " " " " " " " "                                     | Recovered; wore tube 3 d. 21 h.   |
| 69  | April.        | M.   | 1 11 | 3 d.                             | 1 d.                    | Not exam.  | Exten. to bronchi.....                                      | Died 1 d. after intubation.       |
| 70  | "             | M.   | 2 2  | 3 d.                             | None.                   | No albumin | " " " " " " " " " " " "                                     | Died 2 d. after intubation.       |
| 71  | "             | F.   | 1 7  | 3 d.                             | "                       | Albumin.   | Asthenia.....   | Died 2 d. 2½ h. after intubation. |
| 72  | "             | F.   | 4 0  | 3 d.                             | 10 d.                   | "          | Exten. and nephritis.....                                   | Died 2 d. 4 h. " "                |
| 73  | May.          | F.   | 4 9  | 3 d.                             | 3 d.                    | "          | Nephritis and exhaustion.....                               | Died 7 d. " "                     |
| 74  | "             | M.   | 5 9  | 1 d.                             | 4 w.                    | "          | { Scarlet fever, with diph- }<br>theria four weeks before } | Recovered; wore tube 4 d. 10 h.   |
| 75  | "             | "    | 7 1  | 12 h.                            | None.                   | No albumin | " " " " " " " " " " " "                                     | Recovered; wore tube 4 d. 10 h.   |
| 76  | "             | F.   | 3 1  | 1½ d.                            | 14 d.                   | Not exam.  | Exten. and pneumonia.....                                   | Died 2 d. 5 h. after intubation.  |
| 77  | "             | "    | 3 0  | 1½ d.                            | None.                   | "          | Exten. to bronchi.....                                      | Died 1½ d. " "                    |
| 78  | "             | M.   | 4 9  | 3 d.                             | 4 d.                    | "          | " " " " " " " " " " " "                                     | Recovered; wore tube 4 d.         |
| 79  | "             | F.   | 4 8  | 1 d.                             | 3 d.                    | "          | Heart failure—(Sepsis).....                                 | Died 17 h. after intubation.      |
| 80  | "             | M.   | 3 2  | 2 d.                             | 5 d.                    | Albumin.   | Exten. and pneumonia.....                                   | Died 1 d. " "                     |
| 81  | "             | M.   | 7½   | 1½ d.                            | 2 d.                    | "          | Nephritis, pneumonia.....                                   | Died 1 d. 18 h. after intubation. |
| 82  | July.         | M.   | 2 5  | 12 h.                            | 2 d.                    | Not exam.  | Exten. and pneumonia.....                                   | Died 22 h. " "                    |
| 83  | "             | M.   | 2 5  | 1 d.                             | 2 d.                    | "          | Pneumonia.....  | Died 8 d. 19½ h. " "              |
| 84  | "             | F.   | 1 4  | 1 d.                             | 2 d.                    | "          | Exten. to bronchi.....                                      | Died 26 h. " "                    |
| 85  | Sept.         | F.   | 4 0  | 4 d.                             | 12 d.                   | Albumin.   | Convulsions, extension.....                                 | Died 1 d. 22½ h. " "              |
| 86  | October       | F.   | 5½   | 2 d.                             | 4 d.                    | "          | Extension, nephritis, sepsis.                               | Died 1 d. 13 h. " "               |
| 87  | "             | M.   | 4 5  | 3 d.                             | Present.                | "          | " " " " " " " " " " " "                                     | Recovered; wore tube 10 d.        |
| 88  | "             | M.   | 5 0  | 2 d.                             | None.                   | No albumin | " " " " " " " " " " " "                                     | Recovered; wore tube 5 d.         |
| 89  | "             | M.   | 2 12 | 6 d.                             | 6 d.                    | Not exam.  | " " " " " " " " " " " "                                     | Recovered; wore tube 3 d. 19½ h.  |
| 90  | "             | M.   | 5 0  | 1½ d.                            | Present.                | Albumin.   | Exten. and pneumonia.....                                   | Died 6 d. 18 h. after intubation. |
| 91  | Nov.          | F.   | 4 5  | 3 d.                             | None.                   | No albumin | " " " " " " " " " " " "                                     | Recovered; wore tube 6 d. 6 h.    |
| 92  | "             | F.   | 5 0  | 1 w.                             | 1 d.                    | Not exam.  | Exhaustion.....   | Died 1 d. after intubation.       |
| 93  | "             | F.   | 5½   | 3 d.                             | Present.                | Albumin.   | " " " " " " " " " " " "                                     | Recovered; wore tube 7 d. 21½ h.  |
| 94  | "             | M.   | 1 10 | 1½ d.                            | 1½ d.                   | Not exam.  | " " " " " " " " " " " "                                     | Recovered; wore tube 6 d. 21 h.   |
| 95  | "             | F.   | 4 2  | 2 d.                             | 3 d.                    | Albumin.   | Sepsis, extension.....                                      | Died 1 d. after intubation.       |
| 96  | "             | F.   | 3 2  | 2 d.                             | Present.                | "          | Double pneumonia.....                                       | Died 9 d. 21 h. after intubation. |
| 97  | "             | M.   | 6 7  | 3 d.                             | 10 d.                   | "          | " " " " " " " " " " " "                                     | Recovered; wore tube 3 d. 9 h.    |
| 98  | "             | M.   | 3 0  | 2 d.                             | 4 d.                    | "          | Exhaustion.....   | Died 3 d. 8 h. after intubation.  |
| 99  | "             | F.   | 4 0  | 1 d.                             | 2 d.                    | Not exam.  | { Exten. to bronchi sup. }<br>{ of urine..... }             | Died 2 d. 9 h. " "                |
| 100 | "             | M.   | 9 0  | 2 d.                             | Several d.              | Albumin.   | " " " " " " " " " " " "                                     | Recovered; wore tube 4½ d.        |

| NO. | AGE. |    | RECOV-ERIES. | NO. | AGE. |    | RECOV-ERIES. | NO. | AGE. |    | RECOV-ERIES. | NO. | AGE. |    | RECOV-ERIES. |
|-----|------|----|--------------|-----|------|----|--------------|-----|------|----|--------------|-----|------|----|--------------|
|     | Y.   | M. |              |     | Y.   | M. |              |     | Y.   | M. |              |     | Y.   | M. |              |
| 1   | 0    | 4  | 0            | 2   | 2    | 6  | 0            | 2   | 3    | 6  | 1            | 2   | 5    | 8  | 1            |
| 1   | 1    | 4  | 0            | 1   | 2    | 8  | 0            | 1   | 3    | 7  | 1            | 5   | 8    | 1  |              |
| 1   | 1    | 6  | 1            | 1   | 2    | 10 | 0            | 3   | 4    | 0  | 0            | 1   | 6    | 5  | 0            |
| 1   | 1    | 7  | 0            | 2   | 3    | 0  | 0            | 1   | 4    | 2  | 0            | 1   | 6    | 7  | 1            |
| 1   | 1    | 10 | 1            | 1   | 3    | 1  | 0            | 2   | 4    | 5  | 2            | 1   | 7    | 1  | 1            |
| 1   | 1    | 11 | 0            | 2   | 3    | 2  | 0            | 2   | 4    | 6  | 0            | 1   | 7    | 6  | 0            |
| 1   | 2    | 0  | 1            | 1   | 3    | 3  | 0            | 1   | 4    | 8  | 0            | 1   | 8    | 9  | 0            |
| 1   | 2    | 2  | 0            | 1   | 3    | 4  | 0            | 2   | 4    | 9  | 1            | 2   | 9    | 0  | 1            |
| 2   | 2    | 0  | 0            | 1   | 3    | 5  | 0            | 4   | 5    | 0  | 2            | 50  |      |    | 15           |

Total, 50; males, 25; females, 23; not stated, 2; recoveries, 15, or 30 per cent. Average age of patients that recovered, 4 yrs. 8 mos.; of patients that died, 3 yrs. 9 mos.

treated from November 16, 1886, to November 18, 1887, in which the proportion of successful operations is thirty per cent.;

while out of 15 cases intubated during the past autumn there were eight recoveries, or 55 per cent. This he attributes in part to the bichloride of mercury treatment adopted, and to a less fatal type of the disease than prevailed during the spring and winter.

In Case 62, O'Dwyer, for the first time in his experience, pushed down membrane in sufficient quantity to produce apnoea on the first introduction of the tube. As soon as the latter was removed by the string, which was still attached, a cast of the trachea was expelled; but the dyspnoea continued as before, and reintubation gave complete relief. The tube was expelled in twenty-six hours and never needed again.

In Case 75 the tube escaped from the larynx, entered the stomach, and was passed ten days later. The tubes are so long that when the lower extremity leaves the larynx the upper extremity is in close proximity to the front teeth. This accident can, therefore, occur only by its being (1) coughed out during sleep or semi-consciousness, or (2) by being projected up behind the soft palate in the act of coughing or vomiting. In the latter case it must of necessity enter the œsophagus. It is quite possible that some children intentionally swallow the tube in order to get rid of it and prevent its further use. O'Dwyer has known cases in which the child, on getting possession of the tube when no one was present, threw it to a considerable distance or hid it. The danger of lacerating the larynx with the extractor in such cases makes it imperative to never insert the extractor until the head of the tube is distinctly felt by the finger.

Case 87.—O'Dwyer further shows the importance of warning the parents to notify the physician immediately on the return of any difficulty in breathing. As soon as the lumen of the tube becomes seriously encroached upon, the cough ceases to be effective owing to the great reduction in the amount of tidal air, expectoration diminishes or ceases altogether, and the secretions accumulate in the air-passages. In a case quoted, the numerous moist râles heard over all parts of the chest indicated that a fair amount of air was entering the lungs, and yet when the tube was removed there did not appear to be one fourth of its calibre free. The fact that the retention of the tube for a few

hours in the larynx relieves the dyspnoea for a considerable length of time, is further illustrated by Case 97, in which it was retained on the first occasion for only five hours, and the dyspnoea was relieved for twenty-three hours. Besides the opportunity of ample nourishment without difficulty that this affords, it greatly facilitates the permanent withdrawal of the tube at the earliest possible moment.

O'Dwyer reports his third case in which the tube suddenly became occluded with a cast of the trachea too large to pass through, was not expelled, and sudden death from apnoea resulted.

In this connection he says:—"In order to prevent the accident that occurred in this case, where loose membrane was known to exist below the tube, several means may be resorted to, but the most important of these is using a smaller tube than that indicated by the scale of years. Had I, for example, removed the 5 to 7 size placed in the child's larynx, and inserted the 3 to 4 size, which would have been perfectly safe, the chances would have been altogether in favor of its immediate expulsion, when occluded below, followed by a cast of the trachea, as the outward pressure of the abnormal amount of air in the lungs must have been very great. . . . Another precaution which I have adopted in several cases, is leaving the string attached and fastening it behind the ear, so that the attendant can quickly remove the tube if necessary. It is objectionable on account of the irritation it produces and the difficulty of preventing the patient from removing it, or cutting it with the teeth. Clearing the trachea of false membrane with a suitable instrument would be the best safeguard against this accident; but it is useless to discuss it until its practicability has been demonstrated."

Denhard invented a mouth-gag, which has been tried in a number of cases and found very satisfactory. As to the other devices, they have not yet been sufficiently used to warrant an estimate of their value. Dillon Brown,<sup>13</sup> of New York, published a list of 806 cases collected from journals, in which he found 221 recoveries, or 27.4 per cent. A little later Waxham, of Chicago, published a list of 136 operations of his own, in which the recoveries amounted to 27.2 per cent. In every case membrane was observed before operation, and it is clear from the reports of cases that in a vast majority death would have speedily occurred

had not the operation been performed. The suggestion, therefore, that the success is due to early operation must fail to stand in the face of these reports.

The operation has not been equally successful with every practitioner. Strong,<sup>69</sup> for instance, reported 32 cases with 31 deaths; while other writers have presented equally lamentable proportions, based, however, on a small number of operations. Taking the general average, as presented in Dillon Brown's table, however, which the large number of cases renders proportionately reliable, the operation shows itself superior to tracheotomy by 7 per cent., taking Trousseau's statistics as a basis.

#### REFERENCES.

1. Brit. Med. Jour. 2. Am. Pract. and News. 3. Jour. Laryng. and Rhinol.
4. Trans. Ninth Inter. Med. Cong. 5. Lomb Prize Essay, published by Am. Public Health Assoc. 6. l'Province Méd. 7. Weekly Med. Review. 8. St. Louis M. and S. Jour. 9. Arch. f. Kinderheilk., 1886. 10. Canadian Pract. 11. Le Progrès Méd. 12. Boston M. and S. Jour. 13. Med. Record. 14. Med. Times and Gaz., 1858. 15. Brit. Med. Jour., 1861. 16. Diphtheria and its Management, 1885. 17. Pittsburgh Med. Rev. 18. Münch. Med. Woch. 19. Deut. Med. Zeit. 20. St. Petersburg Med. Woch., 1886. 21. Arch. de Laryng. 22. Am. Med. Digest. 23. System of Practical Medicine. 24. Cent. f. Klin. Med. 25. Eortschr. der Med. 26. Therap. Monats. 27. Med. Bulletin. 28. London Med. Rec. 29. Thèse de Paris. 30. La France Méd. 31. Med. News. 32. Jour. de Méd. de Paris. 33. N. Y. Med. Jour. 34. Berlin Klin. Woch., 1886. 35. Lancet. 36. Wien. Med. Woch. 37. Med. and Surg. Rep. 38. Bull. gén. de Thérap. 39. Deut. Arch. f. klin. Med. 40. Med. Register. 41. l'Praticien. 42. Med. Gaz. 43. Wien. Med. Presse. 44. Chicago Med. Times. 45. Revue de Chir. 46. Proceedings Royal Society, vol xlii. 47. Edinburgh Med. Jour. 48. Med. Chronicle. 49. Med. Press and Circular. 50. Berlin klin. Woch. 51. l'Concours Méd. 52. Lancet, 1886. 53. l'Abeille Méd. 54. Viertelj. f. Derm. u. Syph. 55. Gaillard's Med. Jour. 56. Cent. f. d. Med. Wissen. 57. Deut. Med. Woch. 58. Volkmann's Samml. klin. Vort. 59. l'Union Méd. 60. Monat. f. Prakt. Derm. 61. Jour. de Méd. et de Chir. 62. l'Union Méd. du Canada. 63. Glasgow Med. Jour. 64. Arch. de Méd. et Pharm. Milit. 65. l'Poitou Méd. 66. Am. Jour. Med. Sci. 67. Practitioner. 68. Revue Mens. des Mal. de l'Enfance. 69. Jour. Am. Med. Assoc. 70. Atlanta M. and S. Jour. 71. Therapeutie Gaz. 72. Liverpool Med. Chir. Jour. 73. Provincial Med. Jour. 74. Arch. of Pediatrics. 75. Jahrb. f. Kinderheilk. 76. Revue Mens. des Mal. de l'Enfance, 1886. 77. Brit. Med. Jour., 1886. 78. Cent. f. Kinderheilk. 79. Arch. f. Kinderheilk. 80. Am. Lancet. 81. St. Petersburg Med. Woch. 82. Vrach. 83. Asclepiad. 84. Revue de Thér. 85. Gaz. des Hôpitaux. 86. Arch. di Patol. Inf. 87. Trans. N. Y. Acad. Med. 88. Revue de Méd. 89. The Prevention of Consumption, London; Kegan, Paul & Trench. 90. Die Allgemeine Pathologie oder die Lehre von dem Ursachen und dem Wesen der Krankheits processe, Jena; Gustav Fischer. 91. Etologisches und Anatomisches über Luugenschwindsucht, Berlin; Hirschwald. 92. Gaz. Méd. de Paris, 1886. 93. Gaz. Hebdomadaire. 94. Gaz. degli Ospitali. 95. Med. Presse. 96. Western Med. Rep.

[Undated references apply to journals published in 1887, and original articles can be found by consulting the indexes of the respective publications.]

## ORTHOPÆDIC SURGERY.

By THOS. G. MORTON, M.D., AND WM. HUNT, M.D.,

PHILADELPHIA.

---

### POTT'S DISEASE.

THE name Pott's Disease has been so universally adopted not only by English speaking people, but by other nationalities, that it is useless and unnecessary to change it. It would be well for any one who has not done so, to read the original essay of Percival Pott, wherein he fully and definitely describes the disease of the vertebral bodies to which his name has justly been given. Pott's essay is one of simple, truthful description of what he saw in his studies of the subject.

It safe to say that not one important fact escaped him, and his "*Remarks on that kind of palsy of the lower limbs, which is frequently found to accompany a curvature of the spine, and is supposed to be caused by it, together with its method of cure,*"<sup>1</sup> stands to day unrivalled.

Pott says: "The primary and sole cause of all mischief is a distempered state of the parts composing, or in immediate connection with the spine, tending to and most frequently ending in caries of the body, or bodies of one, or more of the vertebræ; from this proceed all the ills whether general, or local, apparent, or concealed; this causes the ill-health of the patient and in time the curvature."

It is interesting to note that the line of treatment of the disease before Pott's "remarks" were made, were in the same direction as that almost wholly in vogue to-day, while his own treatment, doubtless for sufficient reasons, has been abandoned, or is only used in a few exceptional cases. In alluding to treatment before his essay appeared, he says: "Before the alteration of figure in the back bone had been discovered, all the attention is paid to the limbs, in which the whole disorder is supposed to reside; and all the applications are made to them,—frictions, liniments,

embrocations, blisters, etc., to which is generally added cold bathing and electricity; when the curvature has been noticed, recourse is immediately had to backboards, collars, steel bodices, swings, screw-chairs, and other pieces of machinery, but all to no purpose. The patient becomes daily more and more helpless and unhealthy, languishes for more or less time, and at last dies,—either in an emaciated state from a hectic, or by a drain from an abscess formed within the body.”

Pott goes very far in his condemnation of machinery from the most simple to the most complex, and after showing that he fully appreciates the reasons for which artificial supports are used he says: “I cannot help bearing my testimony against the indiscriminate and very improper use which is daily made of them.”

His own treatment consists merely “in procuring a large discharge of matter from underneath the *membrana adiposa* on each side of the distempered bones forming the curvature, and in maintaining such discharge until the patient shall have recovered his health and limbs.”

Free and deep incision on either or both sides of the projection and the keeping the drain open by issue, peas, or beans are the methods adopted. “A cessation of the erosion of the bones,” follows in varying times. “This is followed by an incarnation by means of which the bodies of the vertebræ which had been the seat of the disease coalesce and unite with each other, forming a kind of ankylosis.”

Of course rest in bed is requisite, and when the patient begins to walk, “adults find assistance in crutches, by laying hold of chairs, tables, etc.; but the best and safest assistance for a child is what is called a go-cart of such height as to reach under the arms, and so made as to inclose the whole body.”

Surely, Pott's ideas of treatment were based upon attacking the disease *in situ*. Who knows but what in these days of antiseptic surgery we may practically return to his methods in a much bolder way? Such treatment would be positive and based upon sound pathology, while the most that can be said of the present method of treatment, in all of its varieties is, that it is expectant. No advocate of mechanical fixation could be more enthusiastic than Pott as to belief in his methods and as to results.

The following quotations, a hundred years apart, illustrate

this. Thus, Pott states: "I can say that in the space of three years, during which I have had many opportunities of making the experiment, I have met with but one single instance in which it has failed, where from the state of the disease and the patient there was any reasonable foundation for hopes; that all those who have submitted to keep the issues open long enough, have been so restored to health and to the free use of their limbs as to be perfectly capable not only of exercise, but of hard labor; and that I have never yet, among those so treated, met with one on whom the disease has returned."

And thus Noble Smith, of All Saints Children's Hospital, London. Seventy consecutive cases of caries of the spine are reported. Mechanical fixation, recumbent position in severe cases, free locomotion with spinal fixation in others, constitute the lines of treatment. Six of these died, "three from causes independent of the diseased spine." Of the remaining cases many are absolutely cured, many are progressing toward cure, and a very few indeed are otherwise than progressing satisfactorily. In not one single instance has the deformity increased after the application of the instrument. I believe that no such satisfactory results of treatment have ever before been recorded." So Pott, of the 18th century, according to his own statement, beats Noble Smith of the 19th.

The same discussions as to constitutional or local causes, as injury, for example, prevailed in the old times as at present. Then, however, the constitutionalists seem to have been in the majority, while now the localists are in the ascendant. Pott was decidedly one of the former. The truth probably lies between the two extremes.

In looking over the various articles for the year 1887, upon "Pott's disease," "caries of the spine or vertebræ," "spondylitis," or whatever name may be used, nothing especially new is to be noted, as to pathology or treatment. The great impress which Prof. Sayre made upon the profession by introducing the plaster jacket for the purpose of fixation and of securing locomotion during treatment where possible, seems to have gained rather than to have lost its force as some have maintained. There is scarcely an article to be found in the American, English and Continental journals that does not in some way allude to it, and mostly in an approving way. Often, if the direct plan is not adopted, it

is the foundation of whatever may be done. Objections are made mostly of a character which are easily remedied. Thus, Dr. Bruns,<sup>2</sup> of Jatimir, Russia, says that a serious drawback of Sayre's jacket is that it cannot be taken off at will. He substitutes a corset made of plaster of Paris and water glass, for which he says the only instruments required are scissors, a knife and a cobbler's awl. When the Sayre jacket is used, lice get under it, sores occur, bathing can not be had with facility, etc. To this Dr. Reginald H. Sayre<sup>3</sup> answers, (1) that the water glass jacket is nothing new; (2) that the plaster of Paris, by virtue of its much greater porosity (which he has proved by experiment), is much superior to the glass, and further that it can be made as light as any other efficient dressing; also that lice get under one as well as the other, and, also, what is much more important in *acute* cases of Pott's disease, the jacket should not be moved any more than splints should be moved daily from a broken leg. Very different, he says, is the treatment of lateral curvature. Here the jacket is *always* cut open and *removed every night*, and while the patient is practicing gymnastic exercises, which are as essential to the cure of this disease as rest is for the other. "My father has taught me these principles for many years."

Dr. H. C. Wyman, of Detroit, advocates a periosteoplastic operation for the treatment of Pott's disease. His experiments on dogs are encouraging. The object is to form a continuous bony splint, connecting the spinous processes of the diseased vertebra with the adjacent healthy ones. The operation consists in dissecting, sliding and suturing the periosteum in such a way as to favor an osseous deposit between the spinous processes.

Dr. Pitcher, of the U. S. Marine Hospital Service, says that he has seen a number of cases of Pott's disease among the Indians of Southeastern Alaska. Bony ankylosis generally takes place, the spine being straight and rigid. The parents make the children keep the spine always in a horizontal position and they go about on their hands and knees. Quadrupeds, never having superincumbent pressure on the spinal column to deal with, are not known to have Pott's disease. The application of the Indian treatment as related above may have its source in this observation. Poor children in civilized life, who have never been placed under treatment, are known to have recovered, and in the early and acute



stages they have gone about on all fours. The hunchbacks of remote history probably did the same thing in their early lives.

H. Nebel<sup>1</sup> says that before Dr. Phelps, a former assistant of Dr. Sayre, showed them at Frederickshain and other European clinics how to apply his (Sayre's) method, it was imperfectly done and sometimes abandoned. The impression was that a forcible stretching of the spinal column was necessary, until Phelps told them that the feet need not leave the floor and only so much stress should be put on in the suspension as the child could bear, the relief of pain, instead of the increase of it, being the test. Not only in Germany, but at first almost everywhere, the impression was that the Sayre method consisted in forcibly pulling out the projection before the fixation was applied. Many doctors have disappointed patients and their relatives greatly through this absurd misapprehension.

The writer further says that any one who applies the gypsum corsets of Sayre in an intelligent manner will be more satisfied with the treatment of spondylitis by this method than by any other.

Professor Grancher,<sup>5</sup> at the Hopital des Enfant Malades, reports a case illustrating the difficulties of diagnosis in the early stages of Pott's disease, and also the relations of the disease to paralysis. A child of  $2\frac{1}{2}$  years had a fall. Painful torticollis, with lateral left flexion followed. There was pain on pressure over the nucha. Four months after, paralytic symptoms appeared, first in the right arm, then in the left, and alternating. Other parts became involved, and then the characteristic deformity of Pott's disease was found over the sixth and seventh cervical vertebra. This leads the author to the subject of the frequency of paralysis in the disease, and he says "that one may say that cervical Pott's disease always brings paralysis, cervico-dorsal nearly always. Dorsal disease has accompanying paralysis in pretty nearly half of the cases, while in lumbar disease it is exceptional. Paralysis is, therefore, less and less frequent as the disease approaches the inferior part of the column."

This is so different from Pott's statements that it is worthy of note and further investigation. In fact he calls his essay, "Remarks on palsy of the *lower* limbs," and almost denies that it takes place in the arms, although later in a foot-note he says that since he wrote what he did, he has seen two cases of palsy of the arms.

Reference has been made to the horizontal position, and to going on all fours as favorable to recovery from Pott's disease. Albrecht,<sup>6</sup> of Hamburg, who appears to be a thorough Darwinian, states in the German Congress of Surgeons, April, 1887, that:—"The predecessors of man, milliards of years ago, who went upon all fours, brought upon themselves serious punishment when they too suddenly concluded to use the anterior extremities for prehension and the posterior ones only for support and progression. From this comes genu-valgum, the various forms of spondylitis, and many other ills. Through this unnatural position, the tendency of the skull and vertebral column was to press down upon the sacrum and to slide into the pelvis. By this sudden alteration of position, also, all organs which were not properly fastened, tended to slide out of place, and so the peculiar position of many organs is unexplained. A classical example is found in the descent of the testicle. The descended testicle is a normal hernia, and we consider it pathological when it does not come down! Displaced ovaries and kidneys have here their explanation. All ruptures are caused by the upright position of man," etc., etc.,—all of which is respectfully submitted.

William Alexander,<sup>7</sup> in a paper upon the pathology and treatment of caries of the vertebræ, states that during the past twelve years he has made, and still continues to make, a certain average number of post-mortems in cases of Pott's disease, in spite of improved methods of treatment. He has made post-mortems in about 53 cases. Of these 5 had cervical, 20 dorsal, 20 lumbar, and 8 dorso-lumbar caries.

He makes the singular remark that "no spine can be considered cured until a post-mortem has been made!" Why a perfectly healthy hunchback, one who has been so for many years after his malady ceased to trouble him, cannot be considered cured is hard to understand, unless the persistent deformity is claimed to be part of the uncured malady. In that sense there is no cure at all, nor does it require a post-mortem to find it out. Alexander is of the opinion that the original cause of most cases of caries of the vertebræ is either traumatic or pyæmic. He gives cases illustrating both classes. The traumatic ones are well known. Among the pyæmic ones are a case secondary to hip disease; one following double orchitis, one after a crush of the hands; this last

was followed by caries of the fourth, fifth, and sixth cervical vertebræ as proved by post-mortem. This case had paralysis of the right hand within three months after the original injury. Another case followed abscesses of the neck, for which the patient, a boy of 16, was admitted to the hospital. He was more or less under observation from the 8th of June, 1875, until November 6th, 1878, when he died. The last two dorsal and the first lumbar vertebræ were carious.

Three other cases are recorded, one following caries of the bones of the face and general tuberculosis, one after congenital tumor above eyelids, which was removed and followed by sup-puration, caries of vertebræ and death, and one which was a sequel of a whitlow affecting the thumb.

These cases are extremely important as there was no history of traumatism whatever in any of them, in such a way as to directly affect the spinal column, the disease of which was always secondary, and hence are well named pyæmic.

Dr. Alexander says that a safe and useful cure of caries of the vertebræ can only take place in the straight position, or with a curvature so small as not to interfere materially with the position and functions of the internal organs of the body. Results of this kind of course depend upon having the cases in hand during the early stages of the disease. He believes that the ankylosis of the bodies of the vertebræ to be the least important and least frequent method of permanent cure, although it is the firmest kind of ankylosis. Another kind of ankylosis and a better one is that obtained by the proper application of the plaster jacket. This, by securing the approximation of the pedicles and laminae, favors the gradual formation of osseous posterior and lateral splints; and these compensate for the removal of the anterior splint naturally formed by the bodies of the vertebræ. Thus by securing posterior and lateral osseous union at first, the straightness or natural shape of the column is more certainly preserved, and when the disease has exhausted itself, anterior splints are formed and are sometimes reinforced by ligament, periosteum and cartilages undergoing ossification.

A. Demoulin<sup>8</sup> reports a case of a girl aged 19 who was admitted into La Pitié in June, 1886. She had a tubercular history; had vague pains throughout the back; abscess appeared near the twelfth dorsal vertebræ. After opening it, fistula remained and other fistulae appeared on the level of the seventh and eighth

vertebræ. In September, 1886, after a sharp attack of coughing, a piece of bone, the size of a lentil, was ejected through the mouth. The girl died toward the end of January, 1887. The autopsy showed a highly tuberculous condition. There was a cavity in the body of the eighth dorsal vertebra which admitted the index finger. By means of the thickened pleura, the right lung adhered firmly at this place to the vertebral column. There was an ulceration which communicated with the osseous cavity posteriorly. Anteriorly, by means of a bronchial fistula, the fragment of bone passed into the trachea and was ejected by the mouth.

Hodgen,<sup>9</sup> of St. Louis, thinks that the treatment of psoas abscess from caries of the spine, by early aspiration, has not received sufficient attention. He prefers this method to the other two, viz., that of letting the abscess alone, either to spontaneously open, or to dry up, and that of free opening, with drainage. In the discussion which followed, it was interesting to note that the tendency of orthopædic surgeons was to refrain from operation until compelled to act, both in these cases and in the treatment of hip-joint disease, and to rely more upon early and proper fixation.

Dr. Bradford, however, gave the histories of five cases in which he had performed Koenig's operation, cutting down and removing caseous matter and fragments of sequestra. All the patients did well. This is in accord with what is suggested in the comments upon Pott's treatment, in this paper.

Dr. Hodgen<sup>10</sup> also read before the Southern Illinois Medical Society, an interesting paper upon spondylitis. The pathology, symptoms, and treatment are well described. The difficulties of early diagnosis are dwelt upon. Psoas contraction is one of the early symptoms in dorsal and lumbar cases, as is also spinal rigidity. For the detection of the latter, the patient should be laid flat upon the face and belly. Then the right hand is used to raise the pelvis, by taking hold of the ankles or knees. By raising and lowering the pelvis and moving from side to side, the movements of the vertebra may be noted and rigidity detected. Psoas contraction may also be detected, while the patient is in the same position, by laying one hand over the origin of the muscle and gently raising the leg from the table with the other. In Treves' Manual of Surgery, Hodgen thinks, the best description of the formation and descent of a spondylitic abscess is to be found. He

prefers the "spinal assistant" as used by Drs. Shaffer and Taylor of New York to any other form of supporting apparatus.

He makes the ordinary objections to Sayre's jacket, but as before noted in this paper, it is surprising to find on reading the journals of the year, native and foreign, how this holds its place.

It is rather curious to notice in the literature of the past year on Pott's disease (and the same remark is true as to spinal curvatures of all kinds) how the professional minds seem to be satisfied with its present knowledge of the pathology of these subjects, and also with the present accepted principles of treatment. Almost the only field left for the restless and inquiring orthopædist is the construction of new apparatus and the devising of new methods of applying old ones. These can merely be alluded to here, as those who wish may refer to the original articles, thus:—

Dr. Wilhelm Schultless,<sup>11</sup> of Zurich, in an elaborate, illustrated article, calls attention to "a new measuring and designing apparatus for spinal curvatures of all kinds, and particularly for scoliosis." The instrument itself is also elaborate, and E. Fischer<sup>11</sup> of Strasburg, in acknowledging its great merits says: "Unfortunately the apparatus is dear: it costs 850 marks!"

Prof. Milton Josiah Roberts,<sup>12</sup> of New York, read a paper before the Ninth International Medical Congress entitled "fundamental considerations underlying the successful treatment of deformities, diseases and weaknesses of the spine, by means of a new efficient, comfortable, inconspicuous and elegant corset."

Dr. Chas. F. Spangler,<sup>13</sup> of York, Penna., describes a new method of applying the plaster jacket.

Dr. Rufus B. Hall,<sup>14</sup> of Chillicothe, O., describes "a new instrument for the removal of plaster of Paris bandages." The paper is illustrated by a drawing of a saw, which seems to be well adapted to its purpose.

W. N. Popoff<sup>15</sup> advocates a new apparatus for the extension of the spinal column. There is a drawing representing a patient with the apparatus applied.

Dr. Henry M. Sherman,<sup>16</sup> San Francisco, writes a thoughtful article upon "The Application of the Sayre Plaster of Paris Jacket."

The uses of paraffine in surgery, particularly for splints and jackets for young children, with the method of employment, have also been described.<sup>17</sup>

## LATERAL CURVATURE OF THE SPINE (SCOLIOSIS).

Albrecht<sup>18</sup> (previously quoted) says that scoliosis of the spinal column also includes that of the skull, and this is not to be wondered at as the vertebral portion of the skull, in its act of developing from spinal elements, presents a complex problem.

Further he says that among vertebrates, only birds and mammals are subjects of scoliosis. Other vertebrates (fishes, reptiles) have symmetrical uniting vessels of communication, so that the aortic arches on both sides are equally patulous. On the contrary, the uniting vessels of birds and mammals develop only on one side of the body, while upon the other side they wither early and disappear. In birds the left side remains open, in mammals the right, so that there is a diametrically contrary direction of the spinal axes in these two classes of vertebrates when they are the subjects of acquired scoliosis.

Albrecht then illustrates, by a diagrammatic scheme of the embryonic vessels of birds and mammals, how the former receive upon the left a pure current of arterial blood, while it is mixed upon the right. Precisely the opposite takes place in mammals. The consequence is that the left anterior extremities of birds are in the embryo better nourished than the right, so that at birth the muscles connecting the spine with these extremities are more developed than those of the other side, and the bird at once uses its left wings more freely and in preference to the right, and thus determines a tendency to left-sided dorsal scoliosis.

The pure arterial stream goes to the right in mammals, the impure one to the left. By reason of this the right muscular dorsospinal region and the upper extremity of the system is more developed than the left, and a tendency to right-dorsal scoliosis is thus established.

Exceptional cases are ingeniously explained; for example, Albrecht says, that should there be a deviation from the ordinary method of the origin of the vessels in the embryo and should the right subclavian artery arise from the left, then the left side would receive better blood than the right and so, through better development, determine a tendency to left dorsal scoliosis.

In reference to right and left handedness, one must distinguish between anatomical and physiological rights and lefts. Anatomical rights are all those mammals whose right subclavian arteries have a

centripetal origin, anatomical lefts are those whose right subclavian arteries have a centrifugal origin from the left subclavian.

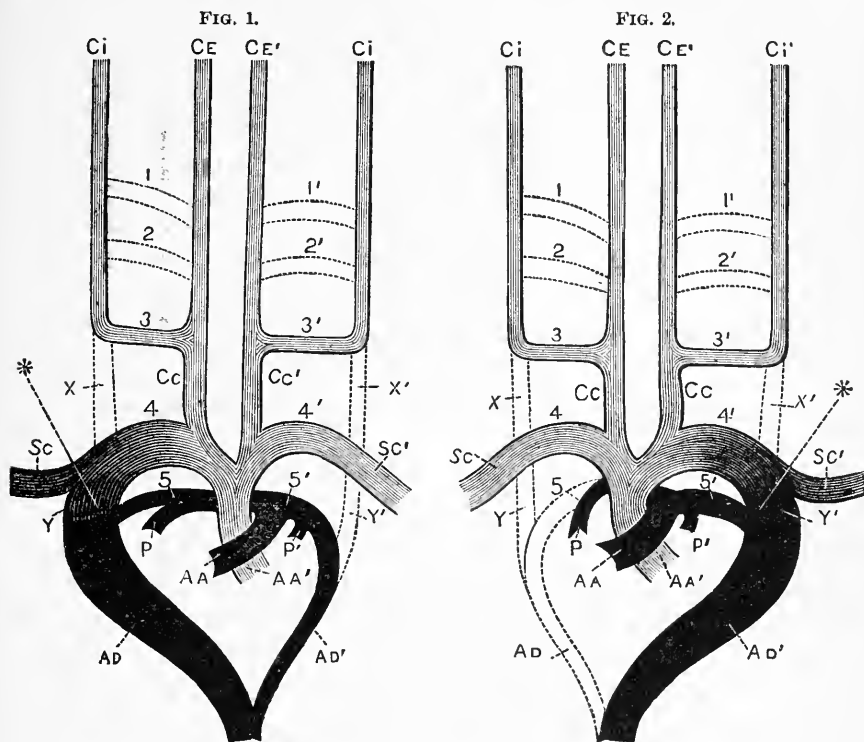


FIG. 1.—SCHEME OF THE AORTA AND AORTIC ARCHES OF AN EMBRYO BIRD.

FIG. 2.—SCHEME OF THE AORTA AND AORTIC ARCHES OF AN EMBRYO MAMMAL.

VENTRAL ASPECT.

1. Right sided. 1. Aortic arches.
2. " 2. " "
3. " 3. " "

Beginning of the right internal carotid artery.

4. Right sided. 4. Aortic arches.

In Fig. 1. Aortic arch.

2. Innominate origin of right subclavian.

5. Right sided. 5. Aortic arches.

(Right artery of Botol.)

P. Right pulmonary artery.

Ci. Right internal carotid artery.

x. Connecting vessel between right-sided 3 and 4 aortic arches.

Y. Connecting vessel between right-sided 4 and 5 aortic arches.

AD. Right descending aorta.

CE. Right external carotid artery.

CC. Right common carotid artery.

AA. Right ascending aorta.

(A). Anterior pulmonary artery.

Sc. Right subclavian artery.

- 1'. Left sided. 1. Aortic arches.
- 2'. " 2. " "
- 3'. " 3. " "

Beginning of the left internal carotid artery.

- 4'. Left sided. 4. Aortic arches.

In Fig. 1. Innominate artery and beginning of left subclavian artery.

In Fig. 2. Aortic arch.

- 5'. Left sided. 5. Aortic arches.

(Left artery of Botol.)

P'. Left Pulmonary artery.

Ci'. Left internal carotid artery.

x'. Connecting vessel between the left-sided 3 and 4 aortic arches.

Y'. Connecting vessel between the left-sided 4 and 5 aortic arches.

AD'. Left descending aorta.

CE'. Left external carotid artery.

CC'. Left common carotid artery.

AA'. Left ascending aorta.

(A). Anterior ascending aorta.

Sc'. Left subclavian artery.

\* Arterio venous stream.  
(Centralb. f. Chirurgie.)

Through custom and cultivation an anatomical right may become a physiological left, and an anatomical left a physiological right. Most human lefts are only physiologically so, anatomically they are rights.

The writer of this article has for a long time maintained that we are right handed simply from the fact, that at birth the right upper extremity is *ab initio* the stronger, and at once is used more freely than the other, and that a left hander may be explained by some defect in the right, or by some trick in nursing. To this as above, Albrecht adds plausible anatomical grounds for its truth.

As regards greater arterial blood supply to the right, in embryonic and foetal life, one only has to look at a wonderful corrosion preparation of Hyrtl's in the Mütter Museum, Philadelphia. (Hyrtl says in his catalogue that it is the most difficult piece of corrosion work he has ever made.)

Augustus Clay<sup>19</sup> divides the causes of scoliosis into congenital, such as faulty positions in utero, malformations of bone and supernumerary halves of vertebræ, etc.; and acquired, such as result from injured or shortened limbs, empyema and contractions, injuries to the chest, etc.; or to idiopathic causes, as those originating from weakness of the spinal structures, making superincumbent pressure less readily borne and also causing the column to be more easily influenced by abnormal positions, etc. He is a believer in preventive measures, such as attention to properly adapted gymnastics, to the forms of desks and to positions while in school. Children should be allowed to romp and play at games of all kinds. Swimming is mentioned as a capital exercise for the dorsal muscles. Equal care is enjoined as to the recumbent position and to rest after fatigue. The "prone couch" of Dr. Verral is recommended. Mr. Clay considers extension couches, thoracic cradles, slanting seats, etc., as not only unnecessary, but harmful. When apparatus is required he believes in a poro-plastic or a divided Sayre jacket, which must be applied and laced up in the extended position and should be remoulded or reapplied every month.

Dr. Lewis A. Sayre<sup>20</sup> in a very interesting paper refers to the faulty manner in which the jacket is often applied and also to the faulty material often used. A case is given where the efforts to rig the jury mast failed in the hands of the attendant, but under Dr. Sayre the plan was pursued of accurately moulding the inside



plaster jacket in at the waist and on the crest of the ilium, and then allowing it to *set* or become thoroughly hardened before applying the jury mast. This method, Dr. Sayre regards as of immense importance.

The essential point of the crinoline is not to have it stiffened with glue or size. If no other kind can be purchased, have the glue or size washed out and the crinoline ironed. Starch in the crinoline will not interfere.

Dr. Roux,<sup>21</sup> of Lausanne, has a paper on the Sayre treatment, and recommends a new method of suspension which is illustrated by diagrams. He claims by it that a constant and definite degree of extension is maintained during the application of the jacket, and the apparatus is adapted to patients of all sizes by means of a regulating and sliding balance.

Great importance is placed upon the early recognition of the trouble, and frequent examinations of the young subject are enjoined, for while scoliosis may have its source in some congenital weakness or deficiency, there is no doubt that it is for the most part acquired by inattention to proper attitudes, to vicious habits as to posture, to faulty dress, to peculiar occupation, and to inattention to appropriate exercises. The much greater frequency of the affection in girls than in boys finds its explanation in the restraints upon the former as to habits, occupations and fashion; so much so, indeed, that the statement is made that when scoliosis occurs in males, the majority of them will be found to have a rachitic history.

Both Lorenz<sup>22</sup> (Vienna) and his reviewer, Nebel, think that too great importance has been given to the influence and frequency of asymmetrical lower extremities in the production of scoliosis. Their experience in measurements does not confirm the view. So far as the American observers of this feature are concerned, the writer of this article is not aware that rarely other than what might be called a false scoliosis is claimed to originate from this cause; although there is no doubt that a very marked difference in the lengths of the limbs might, by giving rise to unequal pressures, determine the true affection. Lorenz and Nebel speak of the obliquity of the pelvis as the cause of the apparent difference in the limbs. This is also fully recognized by others, and in most cases is the factor in the differences, as the acetabulum must

move with the pelvis, and so determine the positions of the respective limbs.

The expression "lower limbs" is rather loosely applied. If they include the innominate bones the measurements must be influenced by their obliquities. Too many cases arising from asymmetry have been relieved by simple and proper treatment, which were, before its recognition, subjected to the irksome jackets and other means of support.

As to treatment, the tenor of the reviewer is greatly in favor of preventive and curative measures by the use of gymnastics, under proper advisors and trained assistants. "He who," he says, "is in the position to give his patients the benefit of rational health gymnastics (Heilgymnastik), will very much narrow the field of the corset treatment of scoliosis. I have without disadvantage, in many cases renounced the bandages where I found the means to treat them by the rational gymnastic system. It has also been the experience of Dr. Nöuchen in the Children's Hospital at Altona, after he had been in Sweden and studied and judged of the matter, to have more satisfactory results with the gymnastic method than with the corset treatment which was formerly our chief or only means of relief. Dr. Cordua has also had a like experience in the polyclinic here."

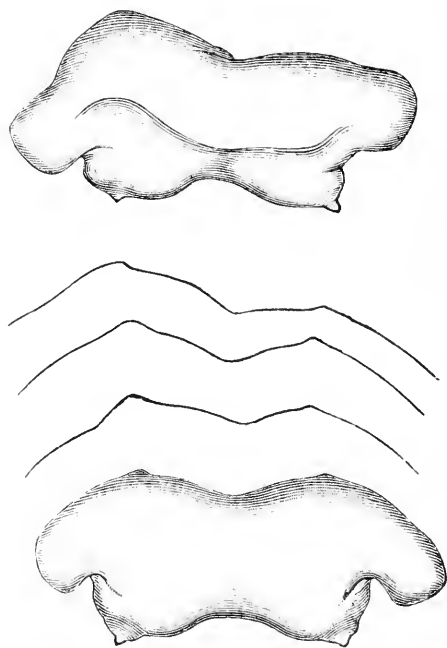
When mechanical methods are requisite, the Sayre jacket and treatment are recommended. Lorenz, the writer says, well remarks that to substitute the felt jacket for Sayre's is a deterioration. Both authors recommend the changing of the jacket once in three months.

Nicoladoni<sup>23</sup> reports an interesting case of scoliosis determined by a severe attack of sciatica (left-sided). There was a left lateral curving of the spinal column in the lower dorsal and upper lumbar regions. The patient could bring his legs and feet together, but if he advanced the left foot in front of the right, he was in imminent danger of falling to the right. The author well remarks that the naming of this condition scoliosis must be taken with reserve.

Dr. James Flemming<sup>24</sup> describes a method of applying extension when the case of spinal disease is treated in the horizontal position. The merit of it is that it permits the patient to turn in various directions, and thus relieves the back from continuous pressure.

Richard Barwell,<sup>25</sup> in four lectures delivered at the Charing Cross Hospital, gives a very complete summary of the present knowledge and treatment of lateral curvature of the spine. His opinions are in accordance with the embryological facts of Albrecht just related, for he says that "Dorsal curvature is usually, though by no means exclusively, to the right. He also teaches that all these curves are produced by one-sided muscular action, and that the contentions about the matter, as opposed to the theory of asymmetrical muscular action, are mere wars of words, for he well says in answer to those who maintain the posture theory only, that postures themselves except those assumed in recumbency are the results of muscular acts.

Therefore he includes in his theory of predominant action of the muscles of one side of the body any and every peculiar posture which such habitual predominance may maintain." Barwell dwells upon the great importance of recognizing the beginning of curvatures, and gives elaborate directions how to do it. The lumbar curves, the pelvic obliquity accompanying them, and their causes sometimes due to differences in length of the lower limbs are all spoken of. These, Barwell says, are much more amenable to treatment than the



(London Lancet.)

dorsal and cervical forms, and nearly always give satisfactory results. The earliest sign of right-sided dorsal curvature before any lateral deviation can be found and before any obvious change in the position of the scapula takes place, is a greater fullness and roundness of the posterior aspect of the right side of the chest, and a certain flatness on the left side around and about the posterior angle of the scapula, as also between that point and the spine. The form should also be investigated from above, either by the

patient sitting on a low stool, or better by the surgeon standing on one while the patient stands erect.

Barwell does not advocate the Sayre jacket, or other forms of jacket founded upon it, but he uses bandages for the loins, dorso lumbar, etc., made of coutie or moleskin, and cut from patterns taken by the surgeon for each particular case. Elasticity is secured by inserting rubber rings at the extremities of the bandages back and front, or in whatever position may be desirable. Cradles and swings are used, particularly at night, and great attention is paid to position, etc., during rest and sleep. By these means it would seem that there is no necessary or irksome interference with the patient enjoying fresh air and taking appropriate exercises.

A case of ankylosis, hypertrophy of the cervical vertebræ and extreme lateral cervico-dorsal curvature, is reported as having been under the care of Robert Jones,<sup>26</sup> in the Stanley Hospital, Liverpool. The deformities followed acute rheumatism. The mechanical treatment was by small beginnings "in a carefully adjusted process of graduated leverage." For example, the jaw and sternum which were together, were separated by paper wedges gradually increased in thickness as the parts began to yield. In time there was room for a Thomas leather collar around the neck; then an iron framework devised for the case, and held *in situ* by a plaster jacket was used with great benefit. "The principle which underlies the treatment of deformities of this type consists in maintaining any advantage gained; hence the value of stocks and wedges." The result of the treatment, considering its almost hopeless nature, was satisfactory.

Dr. Charles N. Stillman,<sup>27</sup> in an article read before the orthopædic section of the New York Academy of Medicine, on the mechanical treatment of lateral rotary curvature, says that too little emphasis has been placed by orthopædic writers upon the reduction of the deformity by traction before any other measures are adopted. He calls the plaster jacket a *passive brace*, holding but half of the spine when ordinarily applied and when it is split anteriorly and used as a lace jacket, so that local treatment may be applied and cleanliness and exercise attended to, it is inefficient. His idea is that what he calls an *active jacket*, capable of producing vertical extension, should be used. It consists of a dorsal, pelvic and cervical portion. By it a "compound twisting force may be

brought to bear upon the spine," the protruding portions are adequately pressed upon, the shoulders are squared, and an *active backward latero-oblique force* is secured from which the patient cannot escape. The mechanical treatment must also be combined with appropriate exercise and for this Dr. Stillman has devised two frames "which are unique and accomplish the purpose admirably with but little fatigue to the patient." Drawings are given.

Prof. Kocher<sup>28</sup> read a paper on the prevention of scoliosis in school children. He believes that structural and architectural changes are produced in the vertebrae by pressure and rotation caused by faulty desks in the school-room. As the best and surest means to prevent lateral curvature of the spine, he recommends a desk with a movable top which can be so arranged that while the child is writing the erect position cannot be changed.

Bradford<sup>29</sup> deems it irrational to envelope the trunk in an inextensible corset and thereby favor the production of muscular atrophy, when muscular development at least on one side is to be desired. The treatment by gymnastics is entered into at length and the various positions and exercises are designated, as also the cases where mechanical treatment comes in as an adjuvant, but by no means the principal one. Gibney<sup>30</sup> is quoted as at first recommending appropriate gymnastics. If, after a few months there has been no change in the deformity, or if it has increased, then it is time to resort to apparatus. This is not intended to correct deformity but to prevent further deformity. Self-suspension by means of a swing or by any other means will bring the spine straight, and any apparatus that can keep it so, whether of steel, felt or other material will be a good brace. Gibney himself prefers almost exclusively the plaster of Paris corset. It is easily renewed every two or three months, can be readily trimmed out to correct chafings, and also is readily adapted to sustain any improvement that may have been gained. The dangers of producing muscular atrophy by its use are *nil*, for in the treatment of scoliosis it was never intended to be worn as a permanent fixture, as it is in Pott's disease, in the acute stages of that malady. In scoliosis it is to be taken off at night, and when the patient is at gymnastics, bathing, etc. Mechanical contrivances, jackets, corsets, braces, etc., for this branch of the treatment of scoliosis, reported and described during the year are numerous and show much knowledge and ingenuity on the

part of their contrivers. Most of them have already been alluded to, with reference, in the article on Pott's disease. As in so many other matters, it must never be forgotten that each case is a study of itself.

If this were always borne in mind it would prevent the arbitrary use of unsuitable apparatus, and also save many of the contrivers of pet supports from much disappointment.

#### RACHITIS (RICKETS).

No new views of any marked significance appear to have been put forth during the past year as to the pathology of rickets.

It is conceded that it is a disease of malnutrition beginning early in life, and sometimes during the fetal stage of existence.

The osteogenetic tissues have lost, if they ever had, in the particular case the power of appropriating the salts of lime in sufficient quantity to make good bone. Why this defect in the organizing powers should occur is a matter of debate. It has been attributed to acid dyspepsia, and particularly to the presence of too much lactic acid, which has a great affinity for the salts of lime. Heitzmann's experiments, as reported by Dr. Lewis Smith in his article on Rachitis,<sup>31</sup> led him to the following conclusions: "My experiments give the result that by continuous administration of lactic acid, at first rickets and afterwards osteo-malacia can be artificially produced in flesh eaters; while in herbivorous animals osteomalacia sets in without preceding symptoms of rickets."

The inflammatory theory has such great authorities as Niemeyer, Kassonlet, and others to support it. The latter is especially strong in this view. The overvascularization, with the accompanying pains, swellings and hypertrophies, are in its favor. If the old aphorism holds good, that absorption is in inverse ratio to the fullness of the blood-vessels, why could not their engorgement interfere with the power of taking up and depositing lime salts, or interfere with any other normal physiological process by which this work may be done? Other authorities, as Pommer, of Gratz, are opposed to this theory, but up to this time nothing more plausible has been offered in explanation of the disease.

Within a few years, phosphorus in minute doses has been largely used in the treatment of rickets. It is singular to note that in Dr. J. Lewis Smith's article published in 1881, there is a quotation from Ziemssen's *Encyclopædia* stating that "Wegner has

recently brought experimental evidence to show that true rickets may be artificially produced by the continued administration of very minute doses of phosphorus!"

Now phosphorus, it may be said, is "all the rage" in the treatment of rickets,—for in Germany the contentions about it, both as to itself and as to its methods of administration, have amounted to a "rage." Thus, the *New York Medical Journal* remarks, "Any one who has followed German medical literature for the past two years, will have a vivid impression of the polemical discussions on the subject of the treatment of rickets with phosphorus. The disputants contested their points with the vigor and bitterness of the religious fanatics of a by-gone age. Not a small portion of the discussion was devoted to the question of priority in recommending phosphorus in rickets.

In this connection it will be of some interest to American readers to turn to a pamphlet on the anæmia of children written by Prof. Jacobi some years ago. In it the author threw out the suggestion that "on the basis of our knowledge of the chemical processes going on in the body, phosphorus should be beneficial in the affections of children, characterized by bone lesions."

In a clinical lecture, Widerhofer<sup>32</sup> says, after remarks upon the etiology and symptoms of the disease, "Starting from the standpoint that rickets is caused by a vascular inflammatory process in the new-formed cartilaginous cells, phosphorus has been tried as a specific medicament against this affection. Experiments with phosphorus for establishing a new formative process of bone had already been performed by Weber; but it was the merit of Kassowitz to have introduced the treatment with phosphorus anew and to have, as it were, created for it a scientific basis. He administers phosphorus in such a way that half a milligram is taken in a day. The usual administration is the following:—

|   |                                |                         |
|---|--------------------------------|-------------------------|
| R | Olei jecoris aselli, . . . . . | 100.0 grams.            |
|   | Phosphorus, . . . . .          | 0.01 " (one centigram). |

Dose : One coffeespoonful a day.

Twenty coffeespoonfuls contain about a hundred grams of liquid. Hence one centigram of phosphorus is contained in twenty such spoons, and one coffeespoonful thus contains half a milligram (0.005) of phosphorus." It will thus be seen that the above prescription is for twenty days' use.

Widerhofer says that the use of the remedy makes on him the impression of not being without success in the second year of life and upwards. He thinks the phosphorus may have an influence on the hardening and solidification of the tubular (long) bones. He has not been able to observe any influence for good in craniotabes, in acute and fresh cases of rickets, and especially in laryngospasmus.

Kassowitz's prescription has been severely criticised. Cod-liver oil and iron has for many years been a standard for rickets, and often cod-liver oil alone. What direct part, therefore, the minute quantity of phosphorus took in any benefit derived, was a question; and other formulæ have been proposed and used. M. Escherich<sup>33</sup> has a notice upon phosphorthrapy in rickets. Thus the (phosphorleberthan) Kassowitz's prescription is condemned for the above reasons, and also for disagreeing with the stomach in certain cases. For the purity of the experiment, therefore, the vehicle of the phosphorus should contain no fat, and especially no cod-liver oil.

Hasterlik, a young chemist in Munich, proposes a method by which a watery solution of phosphorus may be given. The hint was taken from the property of the sulphuret or bisulphuret of carbon to dissolve phosphorus, and also from the fact that the stomach bore a solution of the bisulphuret of carbon well, it having been recommended for intestinal catarrh by Dujardin-Beaumetz. The Hasterlik preparation answers admirably all requirements as to certainty in the quantity of phosphorus in solution and therefore as to definiteness of dose. The dose is the same as that of the phosphorus oil remedy of Kassowitz.

The formula for the "Aqua phosphorica Hasterlikii" is:—

|   |                                       |   |   |   |   |   |   |   |       |
|---|---------------------------------------|---|---|---|---|---|---|---|-------|
| R | Phosphorii.                           | . | . | . | . | . | . | . | 0.01  |
|   | Solve in                              |   |   |   |   |   |   |   |       |
|   | Carboni sulfurati,                    | . | . | . | . | . | . | . | 0.25  |
|   | Aq. destillat.                        | . | . | . | . | . | . | . | 100.0 |
|   | Dose: Half a teaspoonful twice daily. |   |   |   |   |   |   |   |       |

The bottle must be kept tightly stopped, as the sulphuret can evaporate, leaving the phosphorus to fall. Sugar must not be combined with the preparation, but simple syrup may be given separately immediately after taking the dose, in order to correct the burning taste of the medicine, which also seems to have a very unpleasant odor.

Stärker<sup>34</sup> gives an analysis of twenty-three cases of rachitis



treated with phosphorus in the polyclinic of Prof. Thomas, of Freiburg. Kassowitz's formula was used, *i.e.*, one centigram of phosphorus to one hundred grams of cod-liver oil. Coffeespoon doses twice daily.

No other form of medication was allowed while the treatment was in progress. Diet and hygiene were of course strictly attended to. The ages of the patients were between a few months and four years. Between one and six centimetres of phosphorus were used in a single case. One case only had disturbance of digestion. In four the digestion was improved.

A favorable influence was noted in the ossification of the skull in 15 cases. In 14, teeth development improved. Deformities of the thorax were influenced 9 times favorably, 7 times very little, and one time not at all. There was improvement in the shapes of the epiphyses in 21 cases. One case of spasm of the glottis improved. Sweating of the head improved in 15 cases. The effect on restlessness and night terrors was favorable. Capability for locomotion was improved in 17 cases, in 2 not positive, in 4 negative. The influence in 11 cases of crooked extremities was favorable, 4 not positive, 2 negative. The general condition was benefited in 18 cases.

Improvement was generally noticed in from two to three weeks after the phosphorus treatment was commenced.

Dr. Vineberg<sup>35</sup> reports a summary of the experience of several eminent practitioners in the use of phosphorus in rickets. Soltmann had good results in 70 cases. Unpleasant consequences were not noted in a single instance. W. Meyer met with similar good results in 42 cases. He looks on phosphorus as a specific in rickets; when properly administered it always leads to positive results. Petersen has treated 200 cases with phosphorus and looks upon it as a specific in the disease. Sigel concludes, on the basis of 40 cases in private practice, that general treatment is of the greatest importance, but that instead of iron, lime, etc., phosphorus should be substituted. Unruh made extensive observations in the Dresden Hospital for Children during 1885 and 1886. He says of phosphorus that "it is a valuable remedy in rickets, and is more efficacious than all other remedies heretofore recommended. Töplitz, of Breslau, has had a very large experience. He treated 518 cases with phosphorus combined with cod-liver oil. No ill

effects were observed. In all cases there was an improvement in the general condition. The nervous symptoms and pains in the limbs disappeared and motion became more active. Of 208 cases of craniotabes, 176 were cured in 8 weeks; of 58 cases of laryngismus stridulus the attacks ceased in from 8 to 14 days, after having continued for months under other forms of treatment.

The influence on dentition was beyond a doubt. The bodily weight increased, the lungs expanded, the circumference of the thorax increased and the catarrhal conditions disappeared. Toplitz says, also, that the favorable progress is independent of the surroundings, which in the majority of cases can not be altered.

From the above reports it is to be inferred that Kassowitz's prescription was used.

#### SPINA BIFIDA.

Some interesting cases are reported, but no views as to the pathology or treatment of the deformity are published. While most cases are hopeless and fortunately die early, still the fact that some recover and even live to adult age is an inducement to continue investigation in various directions.

Dr. Dollinger,<sup>36</sup> of Buda-Pesth, reports a successful operation on a child of five years of age. The tumor was growing. It was just above the sacrum, was elastic and 36 centimetres in circumference.

There were paralytic symptoms which always disappeared after puncture. The sac was removed and the dura sewed up; then the muscles around the border were severed and the two sides of the arch chiseled down so as to be broken and bent together and united by suture in the median line. Tendons, muscles and skin were then sutured.

The wound healed kindly, the nervous phenomena disappeared and there was no relapse (up to what time not stated)

An interesting case of immediate operation after birth is reported by I. W. Carhart,<sup>37</sup> of Lampasas, Texas:—

There was unexplained obstruction in delivery. In the course of the efforts to deliver, there was a sudden gush of water and the child was born. The trouble, it was found, came from a spina bifida sac, which ruptured and it is said must have been as large as the child's head. After proper attention to the mother, finding the child was living, Dr. Carhart cut a flap of skin from the empty sac,

sufficient to cover the bared portion at the seat of rupture. The lower portion of the circumference of the flap was undisturbed. The parts were washed antiseptically (bichloride 1: 5000) and stitched accurately, with fine silk. Adhesive plasters in various directions were applied. On the fifth day the child was doing remarkably well, and gave a good promise of complete recovery.

In a lecture on *spina bifida occulta* given by Bland Sutton<sup>38</sup> at the Middlesex Hospital, the operative treatment by injection as advised by Dr. Morton, of Glasgow, and known as his method, was advocated. Morton's prescription is: Iodine, 10 grs.; iodide of potassium, 30 grs.; glycerin, fʒj. The tumor is about half emptied, and fʒss to fʒiij of the solution is slowly injected, and allowed to remain. The operation may be repeated in a few days if necessary. (W. H.)

#### LATERAL SPINAL CURVATURE, AND IMPERFECT SYMMETRY.

Early in the year the writer published a monograph upon this subject, of which the following is a condensed reproduction:—

"Few things in nature," says Paget, "appear more constant and exact than that symmetry of organic form which is shown in the likeness of the several members of each two or more corresponding and similarly useful parts. The example nearest to each of us is the symmetry of the two side halves of his own body; it usually appears perfect, and yet it is probable that the symmetry is never quite perfect, never mathematically true."<sup>39</sup>

The head presents, in a very remarkable manner, almost constant deviation from bilateral symmetry. Hatters have long recognized these irregularities of the cranium, which frequently are very extraordinary, and have found it necessary to employ an instrument known as the "conformer," or head measurer. This apparatus, when placed upon the head, just where the hat is worn, gives an exact outline diagram which shows every irregularity in the circumference of the head. Scarcely any two such measurements are alike; all show to greater or less extent, variation from symmetry.

The eyebrows, nose, ears, mouth and teeth constantly show deviation from symmetry. The eyes vary in refraction: one may be emmetropic, the other myopic or hypermetropic; or myopia may exist in one eye and hypermetropia in the other.

"Defect of symmetry, which can be seen in the face," says Paget, "is consistent with remarkable beauty. There is an extreme example of both in the lovely face of St. Mary of Egypt, by Ribera (Spagnoletto), in the Dresden Gallery. The left side of the face is much smaller than the right, and more oblique in its inclination from the median line."<sup>10</sup> "It is undeniable," writes Miss Sartain, Principal of the Philadelphia School of Design, "that the Greek sculptors had perceived bilateral asymmetry in nature. Even in their ideal heads one can find it. The Venus of Milo and the Ajax show marked disparity in the two sides of the head. As to the body and limbs, it is not very easy to test their likeness or unlikeness, since they are always expressing diverse movements on the two sides, and different muscles are called into play.

"Theseus and Ilyssius could not possibly have been modeled without a thorough knowledge of internal as well as external anatomy, the result of dissection; and such close observers could not fail to notice every peculiarity that dissection discloses.

"Besides, reasoning by analogy, since they have proved their knowledge of the fact in the execution of some of their busts, and the heads of some of their statues, we may be sure that they knew that the want of absolute symmetry extended to the whole figure. It would require close observation and patient study to test their expression of it in their sculpture. Being subtle in nature in well built forms, they would express it subtly. Even in the heads, a superficial student, copying unintelligently, might be blind to it."

"Both of the upper extremities," says Hyrtl,<sup>41</sup> "are seldom of the same length. The difference is in favor of the right by two or three lines. From congenital causes, the difference may be greater; but is not, except in cases of great deformity, betrayed so readily as those of the lower extremities, which become manifest by limping. Also, the strength of the upper extremities is seldom equal. This is not owing to the greater use of the right, but there is an original difference in the muscular development of both extremities in favor of the right one, which gives to this a marked prevalence over the left. We use the right extremity more than the left, because it is the stronger; but it did not become the stronger because it was more used."

Measurements of the lower extremities show that the limbs are very commonly unequal in their length. Indeed, this condition

is so universal, that bilateral asymmetry can properly be said to be the rule and not the exception. "Although the strength of the lower extremities," says Hyrtl, "is not the same, and the right prevails over the left, *yet their length must be precisely alike*. Small congenital or acquired differences betray themselves through a limping gait." It is somewhat remarkable that so close an observer as Hyrtl, who noticed changes in the upper extremity so closely, should have made this statement; for the accommodative conditions of man are so fertile that we find a very large proportion of asymmetrical, short-legged persons, who have never been injured, show no limping whatever, and yet with differences varying from one-fourth of an inch to an inch, or even more. Differences in length of limbs, more than any other factor, probably accounts for the different natural gaits of individuals, who from the beginning have accustomed themselves to it without limping, not knowing they were lopsided. In seventy skeletons examined, Garson<sup>42</sup> found the lower limbs equal in but seven. His measurements show that in 54.3 per cent. the left was longer than the right; in 58.5 per cent. the left thigh bone was longer than the right. The right tibia was longer than the left in 41.4 per cent., and the two bones were found equal in but 10 per cent. The difference in the length of the lower limbs varies from one-eighth of an inch to one and five-eighths, without any deformity being recognizable. The feet are seldom, if ever symmetrical, in their length or otherwise. The ordinary difference in length varies from one-sixteenth to three-eighths of an inch; occasionally it is much greater.

In an Egyptian statue and the Apollo Belvedere the retreating foot is larger than that which is stationary. In the Laocoon, the same inequality in the size of the feet is seen; the left leg of the Apollo is longer than the right by a couple of inches.<sup>43</sup>

Professor Joseph Leidy, who examined with the writer several asymmetrical individuals, says: "In the course of my studies in zoölogy and comparative anatomy, I have had occasion, almost incessantly, to notice more or less abnormal symmetry, in contradistinction to that which must be considered normal,—as the usual want of symmetry in the abdominal digestive apparatus, in the development of the female generative apparatus, on one side only in birds, etc. It would appear as if there was even great difficulty in maintaining ordinary bilateral symmetry. In the cetaceans, the

nose commonly exhibits more or less want of symmetry, and in man I have never found complete symmetry throughout the nasal cavities. I have nowhere read of observations like yours, which appear to me to be so important in their practical application.

"Many common beliefs, such as the current one taught in our catechisms, that man, some centuries ago, was perfect (without evil tendencies or maladies), overrules every logical, palæontological induction and contradicts our experiences.

"The common assumption that perfect bilateral symmetry prevails in the human organism precludes our recognition of the actual great disparities in correlative features. In trees, the factors of diversity (winds, light, nutrition, etc.) are not uniformly distributed, and hence the variations that are so conspicuous.

"There is a striking likeness between the two halves of animals, or organs on opposite sides of the bodily axis, but great disparities may exist that do not affect the gait or attract the attention of the individual or spectators. I have witnessed men with an inch difference of length of limbs, who were utterly unconscious of it. The strides were equable, just as in the case with my saddle horse, Grevie, with whom the difference in limb length was two inches, yet his gait was remarkably equable. A practiced eye could detect the greater angles in the articulations on one side, which arose without the interaction of will, from the necessities of the stride. Let the bilateral likeness be ever so great, a good observer will discover discrepancies which escape the notice of the individual possessing them and of other observers. No human face is ever alike on both sides, nor in any feature of it. The great models of the antique present no perfect bilateral resemblance, and if they were alike in a work of art, we should at once say that the artist had not studied nature. We see things as we think, not as they really are. Though we now know that the sunrise is caused by the turning of the earth, still our early notion that the sun rises, still prevails, and will until we are taught earlier the truth. The two sides of no man are alike in any thing; yet not one in a thousand ever discovered it in themselves.

"Just as educated men have outgrown the belief in the original perfection of mankind, so artists have outgrown the prevailing belief in the equality of the two sides of the human body, or bilateral likeness.

“The variation of but one-tenth of an inch in the perfect circularity in the tire of the driving wheels of a locomotive, has been known to squander energy enough (measured in cost of extra consumption of coal) in a few years, to buy a new locomotive, while the shock of the incessant concussion on the road, and to the locomotive itself, are further aggravations. Such small deviations from symmetry in motive machines have vast significance; yet the sequences of human asymmetry, so overwhelmingly important to intelligent life, have scarcely realized the attention of practitioners, or been brought within the scope of practice, nor even recognized until disaster has arisen, possibly at a period of organic development when the physician can play the part only of the tinker instead of a builder or rebuilder.

“The initial causes of asymmetry present a new field for directive judgment and exploration. The omnipotence of reacting circumstance (pre-and post-natal) is usually overlooked in attempts to obtain equable acting motive structure. Neither element nor organ disclose to observation how either will act until reacting circumstance has been estimated.

“The measure of one limb gives no certain knowledge of what the length of the other is, or was before fracture. That a man finds one limb longer than the other after recovery from fracture, is no proof that they were not even more unlike before. My guest, now with me, was asked a moment ago to stand close against the wall while I measured his height. The supreme height was taken, when he quite unconsciously was standing on one foot flatly, while the toe of the other only rested on the floor, showing the greater length of one limb.”

Imperfect symmetry of the lower limbs deserves a larger share of attention than hitherto has been accorded to it, and in discussing “orthopædics,” which has for its object the correction and prevention of deformities, inequality in the length of limbs may be appropriately considered, which is liable to cause, not only deformity, but consequences most serious. Variations in the length of the lower limbs may produce not only spinal curvature, which it would indeed seem must necessarily happen when there is any inequality, but serious spinal symptoms may result from such imperfect symmetry. Recently the writer brought before the Philadelphia Academy of Surgery several cases of scoliosis which were caused

by asymmetry; and subsequently exhibited to the College of Physicians<sup>44</sup> a case of marked spinal deformity, with a permanent curvature with rotation of the vertebrae, from an asymmetrical condition which had not previously been recognized.

Lateral spinal curvature, as a result of unequal length of the lower limbs, may exist without giving rise to any symptoms. The individual even, may not be aware of any such defect. The curvature which is accommodative is simply due to adjustment.

“Difference of volume,” says Mr. Paget,<sup>45</sup> “is often as marked as is that of length; and it is sometimes sufficient to suggest suspicion of disease. But the suspicion may generally be dispelled on finding that there neither is now nor ever has been any other sign of disease in either limb, and that it is difficult to say which of the two unequal limbs is the better or the more appropriate to the other parts of the body. The difference of length has usually more importance in practice; for it may be associated with appearances of deformity resembling those which are due to really morbid shortenings of a limb, such as may ensue in the defective growths during infantile paralysis, or disease of the hip or knee, or any similar affection. Many cases of suspected slight curvature of the spine are only examples of the adjustment due to inequality of the lower limbs, and in every such case they should be measured and compared.”

The discovery of asymmetry in the length of the lower limbs dates back but a few years. During the writer's term of service in the Pennsylvania Hospital, in the winter of 1873, he had under care an adult with simple fracture of the femur. After his recovery, he found that the injured limb was an inch longer than the other one. This was very puzzling and led to an investigation of the cause, which was at once suspected. The hospital resident, Dr. Wm. C. Cox,<sup>46</sup> had his attention drawn to the subject, and undertook a series of measurements, not only of those who had fractured limbs, but of sound persons who never had an injury. The variations in the length of limbs were found with an ordinary tape measure to range from one-eighth of an inch to seven-eighths. In 54 persons examined, only 6 showed the limbs equal in length.

Some years since the writer was so impressed with the inaccuracy of measurements made with the tape-measure, the only then known method for determining shortening, that he was led to devise an instrument for the purpose. The difficulty in applying



this apparatus being considerable and objection often made to its use, the writer subsequently devised the method described further on for determining any shortening in length of limbs, which has since been generally adopted.

The variations in the 608 measurements made ranged from 1-8 of an inch to 1.7-8. 109 showed a difference of 1-8; 107, 1-4; 48, 3-8; 24, 1-2; 13, 5-8; 2, 1.1-8; 1, 1.5-8; 1, 1.7-8. Even those persons who exhibited the greatest amount of shortening were not aware that one limb was deficient in length as compared with the other. The trousers, however, showed that they were much more worn at the heel on the short side, and this fact had occasionally been recognized by the individual. It is probable that, with the greater accuracy now obtained in measuring, a larger number of the above cases would have been found to be asymmetrical.

It does not always seem possible to determine if the inequality in length of the lower limbs is congenital or acquired. Occasionally several members of one family have been found to be asymmetrical; indeed, such defect often appears to be hereditary. As a result of nerve disease of intra-uterine life, an arrest of development occurs, which can always be seen in after life. From this cause arise the varied forms of clubbed hands and clubbed feet. In congenital talipes, there is always more or less palsy or feebleness of certain muscles or groups of muscles, which is never recovered from; and every part so involved shows a permanent variation in volume, as well as in length of limb, when compared with its fellow. Infantile palsies, even if their duration is brief, cause an arrest of development and the pathological changes resulting from such nerve lesions are only partially, occasionally never, recovered from. Premature ossification, or injury of articulation cartilages, plays an important part in determining variation in the length of limbs. When the spinal cord on one side alone is implicated in disease, the pathological changes (atrophy) affect all the structures of the side, and an asymmetrical condition is the result; and this imperfect development is found just in accordance with the extent of the nerve injury. Structures which so present defective development, regain only a portion of what has been lost; they never attain the normal development seen on the uninjured side of the body.

Many persons who have marked asymmetry may be totally unconscious of the defect; for no symptoms may have occurred to attract their attention. Other persons, again, with even slight variations of limb length, may suffer very considerably; and in such instances when the asymmetry has been corrected, a very slight subsequent variation occurring will be quickly recognized. A prominent railroad official who lost his leg more than 30 years ago, and who has had considerable experience in artificial limbs, has found that, to enjoy perfect comfort, his artificial limb must be made absolutely symmetrical, as to length, with his other leg; that any difference can promptly be recognized, even the 1-16 or 1-8 of an inch difference in length, which he has frequently had happen, immediately giving backache, and the usual symptoms observed in some cases of asymmetry. The existence of marked inequality, however, can often be detected in an individual when walking. Such a condition commonly gives rise to a peculiar gait; but any estimate of the actual shortening, based on such an observation, could not, of course, be relied upon. Frequently those who have inequality have had their attention called to the defect from the fact that the pantaloons leg was worn on one side and not upon the other; and tailors having for some time recognized this fact, measure both limbs. In one case to which my attention was directed, where the difference in length was an inch and a half, the person for many years recognized serious discomfort when walking, and pain in the back and loins, and had always selected the more elevated part of the sidewalk for the short limb, for marked discomfort was experienced with the reverse. Even organic changes, with rotation of the vertebræ, will occasionally occur from excessive and unrecognized shortening of one limb; but in such instances, probably a predisposing strumous diathesis exists. In other cases, the bodies of the vertebræ are stronger and so afford greater resistance to unequal pressure.

The method introduced by the writer some years ago to measure the inequality in the length of the lower limbs in the same person, is at once simple, readily applied and accurate. It consists in blocking up the short limb until it is made equal with its fellow.

The individual to be measured should remove both shoes, stand upon a level surface, and the clothing removed sufficiently to fully expose the back from the neck to the heels.

There are three, sometimes four, anatomical line marks which must be considered :—

(1) The vertical, normal line of the spine, made by the slight projections of the spinous processes.

(2) The vertical line, or cleft, between the nates.

(3) The slightly curved, sometimes nearly horizontal line, which separates the buttocks from the thighs.

(4) The popliteal folds.

If the body is symmetrical, these four anatomical conditions will practically be symmetrical, and, consequently, there cannot be any appreciable inequality in the length of the limbs. If, however, asymmetry exists, changes at once will be observed, and just in accordance with the amount of shortening of one limb, so will we find a variation in the otherwise normal conditions:—

(1) The median line of the spine will present more or less lateral deviation, and a curve will be toward the short, or asymmetrical side.

(2) The vertical line between the nates will deviate obliquely toward the short limb; but the most positive and readily noticed variation of lines will be found when the folds of the buttock are examined.

(3) These horizontal, or slightly curved lines, should, in a symmetrical individual, correspond accurately. If asymmetry is present, and the right limb is the short one, the fold of the buttock will be below that of the other side; and just so much as it is found inferior, just so much will be the shortening.

(4) The horizontal crease sometimes seen in the popliteal region, will also show a variation; that of the longer limb will be found to be above that of the short side.

Now, if the short limb be sufficiently elevated by placing a book or a block, or a series of blocks or books, under the foot, the line of the buttocks can soon be made to correspond; and when this is accomplished, the cleft of the nates will be vertical, and the curve in the spine will be corrected. The height it has been necessary to elevate the limb will at once indicate the actual amount of shortening. Such measurements are readily made; and for this purpose the writer devised a series of blocks made of well-seasoned walnut wood, which vary in thickness from a sixteenth

of an inch to two or more inches. The blocks, for greater convenience, are made a foot long and four inches wide.

The variations from symmetry which arise from an unequal length of the lower limbs, are generally very apparent, and of course are in accordance with the amount of the shortening. The accompanying illustrations, showing such an asymmetrical condition, are from photographs taken from nature. The history of this patient is briefly as follows: He was 23 years of age, had long suffered from constant backache, with pain in the loins and pelvis.



FIG. 1.



FIG. 2.

He had been treated for two years for supposed renal disease, and was in no wise benefited. The question of an asymmetrical condition had never been suggested. His health was otherwise good. On examination, the writer found that the entire right half of the body showed unequal development as compared with the left. The right arm measured a half inch less than the left in circumference; the right calf showed a difference of two inches, and the right limb was one and five-eighths shorter than the left. In strength the limbs were about equal. There was no history of infantile paralysis, nor of any accident which could account for the

imperfect symmetry. The short limb was elevated by increasing the height of the heel of his shoe sufficiently to make the limbs symmetrical. Following this, all former symptoms vanished and the patient since that time has had uninterrupted health.

Fig. 1 shows elevation of the shoulder on the short side, which is usually seen in asymmetrical individuals; due, probably, to an unconscious effort made to rectify the inequality by stretching the entire side to equalize the deficiency. The curve in the spine deviates toward the right side. The distance between the spinous processes on the right and on the left side, is marked. The cleft of the nates is oblique. The line of the buttock on the right side is below that on the left side; this same want of regularity is seen in the popliteal region, when the right and left sides are compared. There is also a general flatness of the right buttock, and the right limb is diminished in size as compared with the left.

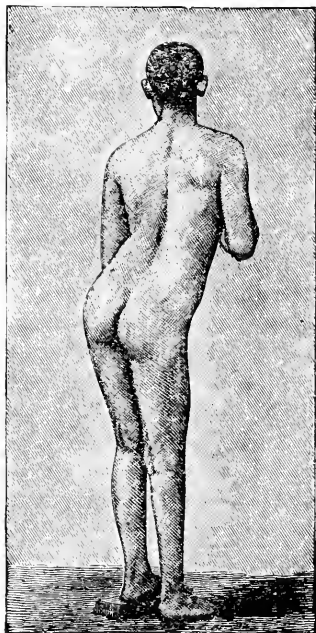


FIG. 3.

Fig. 2.—In this view the right or short limb has been blocked up one inch and five-eighths, which exactly corresponds to the shortening. All deformity is overcome, the shoulders are now symmetrical, the spinal column is vertical, the cleft of the nates is vertical, the folds of the buttocks and the popliteal region are on line with each other, and the normal anatomical fullness about the right buttock is restored.

Fig. 3.—This view is given to show the result of increasing the asymmetry in the already shortened limb. The same block of one inch and five-eighths has been placed under the left or longer limb. The result shows an increase of deformity over that shown in Fig. 1. The shoulder is more elevated, the spinal curvature is increased, the obliquity of the nates is more marked, the right gluteo-femoral fold is seen much below that of the left side, and finally, there is a greater variation between the crease in the

right popliteal region, as compared with that on the left side. In other words, the shortening of the right side has been increased. The original variation of an inch and five-eighths has been doubled by the addition of the block, so that the shortening of the right side has been increased to three inches and a quarter.

In all cases of imperfect symmetry it is not claimed that there necessarily must be a true spinal curvature; although delay in correction may favor such a condition; but usually the curvature occasioned by an imperfect symmetry can be entirely overcome if

recognized sufficiently early; and no spinal deformity nor symptoms need ever occur if the line of the vertebral column is kept normal.

A girl of sixteen was recently brought to the Philadelphia Orthopædic Hospital with prominent spinal symptoms, which the writer found were due to imperfect symmetry. There was a very marked atrophy of the entire right lower extremity which followed an attack of infantile

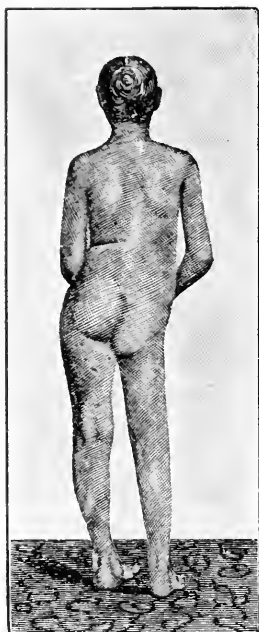


FIG. 1.

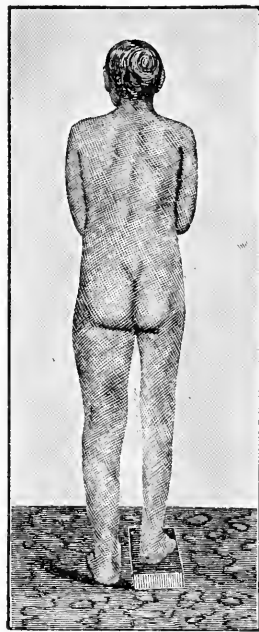


FIG. 2.

palsy; the wasting involved the volume of the limb, and its length as compared with the left. The spinal curvature was found to be simply accommodative and disappeared when a block of two and a half inches was placed under the foot. With this correction the normal anatomical lines of symmetry appeared, and in a short time all the former spinal symptoms were overcome.

Although marked asymmetrical defects may have existed which the individual may not have recognized, it is nevertheless true that many instances of long-continued slight or severe backaches, with pelvic pains, involving the distribution of the sciatic, are frequently

incident to the incessant "shocks" the spine is subjected to as a direct result of bilateral asymmetry. Such cases are promptly and perfectly cured by correction of the asymmetry.

Dr. Goodman, who is one of the United States Pension Examining Surgeons, states that many applications for pension have been made for disabilities described as lumbago, supposed to have been caused by exposure, or from injuries contracted during the War of the Rebellion. In nearly all such cases, an examination has revealed a previously unrecognized asymmetry, and that the symptoms were probably induced by this defect in development.

Experience in a very great number of such cases has naturally suggested the propriety—indeed, the necessity, in every instance where symptoms have resisted treatment—that the presence or not of any asymmetry should be inquired into. Children especially who complain of backache, or so-called "growing pains," should be carefully examined for any such anatomical defects. The possibility of the presence of imperfect limb symmetry is of sufficient importance to claim at least a careful consideration. Its recognition may be of great, if not of vital, importance, and be the means, perhaps, of clearing up a doubtful diagnosis.

#### CLUB-FOOT.

*Treatment.*—It is unfortunate that there should be such difference of opinion among surgeons in regard to the treatment of club-foot. With the opportunities special hospitals and otherwise have afforded for observing the results of operative mechanical or other treatment, it would certainly seem that some clearly defined rules of practice would by this time have been recognized and generally adopted; but such is not the case. Some surgeons maintain that with proper management from birth, all cases of club-foot can and should be cured without any operation. Others recommend tenotomy immediately after birth; still others advise stretching and manipulation until the child is able to stand or ready to walk; then section of all structures which in any wise influence a reproduction of the deformity. With the more marked or inveterate deformities of young persons, or as seen in adults, from want of care or from neglect after operation, or those deformities which have never had any treatment, the question of the most desirable operation is not yet settled.

It would be difficult to enumerate the great variety of instruments which have even recently been devised for club-foot correction. Almost every surgeon has some peculiar apparatus which is believed to fulfill the indications for successful treatment. Some have practical value, others, from their great variety and cost, cannot be made generally available. It can be stated, however, that if every case of congenital club-foot could receive proper attention at birth and subsequently, there would seldom, if ever, be any necessity for the more severe operations which are now so commonly recommended and practiced. The occurrence of aggravated club-foot demonstrates that there has been either want of attention or absolute neglect in the conduct of the case.

Dr. L. H. Sayre<sup>47</sup> maintains that the proper time to treat a case of talipes is at birth. The foot should then be straightened and corrected as nearly as possible, care being taken not to obstruct the circulation. The correction should be maintained for a few minutes, then permitted to relax. The foot should be kept in position by bandages and straps. Manipulation, massage, electricity and strychnia hypodermatically, should constitute part of the treatment. Contractured tendons should be cut, and the correction should be a little more



FIG. 1.

than might seem necessary, on account of the contraction which follows the process of repair. Manipulation and thorough stretching can be best accomplished by the hand. (Fig. 1.) It cannot be practiced too frequently. A marked improvement is soon noticed even in the circulation of the foot and limb. Indeed, the frequent manipulation of the foot is the most important part of the treatment, and cannot be overestimated. When the child is able to stand or ready to walk, division of one or more tendons or fascia may be necessary; but an operation should not, as a rule, be performed until that time. The treatment by manipulation can properly be supplemented by tin, felt or other moulded splints, or plaster dressings, or by the use of a brace. This apparatus should be made very light, and be well padded where any pressure is likely to be made. The shoe has a screw in the heel, which is



worked with a key, by which the foot can be turned to the extreme right or to the extreme left. A vertical screw near the ankle gives all the flexion and extension which may be necessary. The shoe has an inside ankle-strap to hold the foot and to keep the heel well down in the shoe. This strap is attached to the inside of the shoe near the heel; it passes over the foot at the upper part of the instep, and then through an opening or slit and fastens below to a button. Sufficient pressure can be made with this to keep the foot well down while the shoe is being laced up. This apparatus can be used continuously or only during the day-time, and moulded felt or other light splint at night. When the child is ready to walk, a very satisfactory apparatus is the one seen in Fig. 2, 3d series, which extends to the thigh and also has the inside ankle-strap.

In considering the unyielding, rigid varus or equino-varus incident to want of care after operations, or in cases where no operation has ever been performed, section of tendons and fasciæ is seldom sufficient to insure a correction of the deformity; and *brisement forcé* can in some cases be employed with advantage. It is well to poultice such rigid, stiff feet for some days before operating.

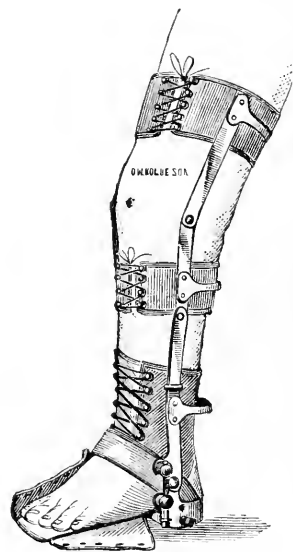


FIG. 2.

For the aggravated club-foot of more mature years, and in the case of adults, Kolbe made for the writer a powerful stretcher. (See Fig. 3.) With this instrument, any amount of force can be exerted upon the tarsus by means of the screw, which breaks the foot into position. The foot can be placed in an exaggerated correction, resolving a varus into a valgus. After the operation the foot should be placed in a well-padded tin, moulded felt, or other suitable dressing.

Since the introduction, however, of the more perfect system of successful wound treatment, operations by open incision, which were formerly entirely unwarranted, can now be performed upon the tarsus with little or no danger; so that any of the various methods for the immediate correction of aggravated foot deformities

which the surgeon may select, can now be properly undertaken and safely accomplished, and in a very much shorter time than any other less radical kind of treatment.

Dr. de St. Germain, Corresponding Editor, in a report on the treatment of club-foot, recommends the simplest form of apparatus; that after tenotomy, massage is the most important part of the treatment; and that any apparatus, no matter what kind is used, should only be considered as an accessory. He presented to the *Société de Chirurgie* a plaquette or wooden sole for the early treatment of club-foot, and also a second apparatus for later use which is more readily applied by parents. These will be fully described in the forthcoming number of the *Satellite*.

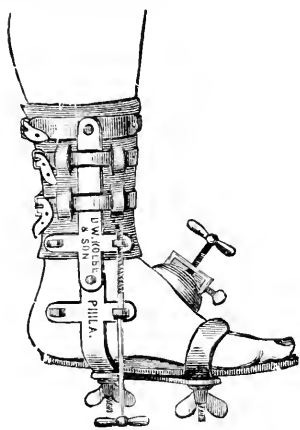


FIG. 3.

Dr. Newton M. Schaeffer,<sup>48</sup> in an elaborate and profusely illustrated paper on the use of traction in the treatment of club-foot, recommends simple traction in even inveterate cases, and maintains that such deformities do not require either osteotomy or open incision. He employs traction in all cases if the deformity cannot be overcome. Tendons are divided, as well as all resisting structures. Some cases do not readily yield to traction alone. They are not common, but when they occur, it is an

easy matter to perform tenotomy and remove the elements of muscular resistance. He knows of no rule by which any one can determine whether a given case will yield to traction, or whether it will require both tenotomy and traction. It will be a very exceptional case that does not yield to the two combined. He does not oppose tenotomy when necessary, but prefers, as the result is so much better, to obtain the result with traction alone if possible, even if a longer time is taken to produce it. The elongated, freely moving and symmetrical foot obtained by traction, more than compensates for the apparent loss of time. Many cases, both among adolescents and children, which have been condemned to tenotomy or even osteotomy by prominent surgeons, have been absolutely restored without operative measures by simple traction, intelligently and perseveringly applied.

Poore,<sup>49</sup> writing of osteotomy for the correction of inveterate talipes equino varus, describes the changes which the articular surfaces of the tarsal bones have undergone. He shows the impossibility of getting the foot into serviceable anæsthetic position without resort to some procedure by which these changed and malformed bones may be so rearranged as to permit of that desirable end. For this purpose the operation of removal of one or more of those bones, or of a wedge taken from the tarsus considered as a whole, has been revived of late, which revival has been permitted and encouraged by the Listerian principles of scientific wound treatment, whereby the formerly frequently deplorable dangerous operations upon such joints have been displaced by the present almost rule of useful cure.

The only operation generally done of late, and found at all satisfactory, has been the removal of a wedge from that portion of the tarsus regarded as a single bone, without consideration of articulation, in front of Chopart's articulation,—the base of the wedge being always the cuboid bone, or even a little more extensive. Excision of the cuboid alone answers in some cases; but as a rule all operations other than cuneiform osteotomy fail to accomplish the object for which they were performed.

He thus describes an operation which he regards as much superior to that which removes a wedge in front of the medio-tarsal joint,—a point one inch and a half in front of the tendo-Achilles at the outer aspect of the foot, forward to the middle of the cuboid bone and down to the tendons of the peroneus longus and brevis, which should be pushed or held out of the way. Another incision, beginning from the middle of the first, and corresponding to the neck of the astragalus, is made directly upwards. The tissues are then raised from the bones and the periosteum incised over that part of the os calcis from which it is desired to remove the wedge. A V-shaped wedge of the proper proportions is then to be cut out with the chisel, and the foot forced about to the extent of overcorrection of the deformity. Having proved that a sufficiently large wedge has been removed, the periosteum and skin are united by sutures, after drainage has been carefully provided for, and a dressing which will supply immobility is applied.

Berger<sup>56</sup> has recently extracted the astragalus from both ankles of a child suffering from double talipes equino varus. Various

other operations had already been done upon the feet, but without special effect. He therefore determined to remove the astragalus, and performed that operation, but was not satisfied with the results, and stated that another time he would resect a portion of the os calcis. In discussion, Reclus said that he had also lately removed the astragalus in similar conditions, and was well satisfied with the results.

Dr. Ernst Reid<sup>51</sup> compares, by means of illustrative cases, the advantages of excision of the astragalus in inveterate cases of club-foot over simple cuneiform osteotomy of the tarsus. The overbalancing advantages which he advances are, that the arch of the foot is preserved; that the bones of the foot are permitted chance for more thorough development; that an almost normal description of foot can thus more readily be attained; and that, instead of an ankylosis of Chopart's articulation, as in cuneiform osteotomy, a syndesmosis is formed between the tibia and fibula and the calcaneum.

He concedes no danger of the foot afterwards acquiring a tendency to turn sidewise, as by some is maintained to occur after excision of the astragalus. The almost exact opposite of the above are his objections to cuneiform osteotomy in young children; but he adheres to his former teaching, that in adults cuneiform excision may be the more appropriate operation. The most desirable time for the operation of excision of the astragalus is fixed by Reid at and during the second year after birth.

Dr. Charles N. D. Jones,<sup>52</sup> in a paper read before the Surgical Section of the New York Academy of Medicine, on the treatment of congenital club-foot by open incision and immediate rectification, refers to the disappointing and unsatisfactory results which have attended the treatment of club-foot; and very justly says that the vast array of mechanical apparatus devised and invented, and the great variety of methods recommended by distinguished orthopædic surgeons for the relief of this deformity, are conclusive proof that no easy, certain and uniformly successful methods have as yet been devised; that tarsotomy and tarsectomy have both been strongly advocated by various surgeons, and the latter operation has become so popular that no less than fourteen varieties of this operation has been devised and practiced. It appears that even this somewhat formidable operation is not sufficient because of the

resistance of the soft parts on the inner side of the foot, so that it becomes necessary, no matter what else is done, to divide all tense structures. Hence it has come to pass that the open incision treatment with fixed extension, recommended by Phelps, is strongly advocated and practiced quite extensively. In other words, the deformed foot is brought into a normal position after sectioning all tissues, hard or soft, which dispose to keep up a malposition, and then applying a fixed dressing. At the end of four or six weeks this plaster bandage is removed, the foot is readjusted, and again dressed in a similar manner.

The operation by the open incision consists in first dividing the tendo-Achilles and overcoming the equinus. Then an imaginary line is drawn from the process of the internal malleolus to the tuberosity of the scaphoid bone. Taking the middle portion of this line, an incision is made downward and slightly backward across the inner side of the foot for an inch and a half. The nerve and the artery may be protected by being drawn to one side of the wound by means of a blunt hook. The foot is gradually unfolded, and the shortened and contracted structures are divided as they present themselves and offer resistance to replacement. The wound is allowed to fill with coagulated blood and the usual antiseptic dressing is applied, over which a plaster bandage is allowed to remain undisturbed for at least four weeks. The wound should then be entirely healed.

At the Congress of German Surgeons the operation to produce ankylosis of the ankle joint for paralytic equino varus, which was suggested some years since by von Lesser, received new attention at the hands of Rydygier.<sup>53</sup> The operation has for its object the prevention of the flail-like motion of the joint by opening and scraping out the synovial cavity, and then doing the joint up in a fixed dressing, that it may have every opportunity to ankylose and thus become of much more utility in locomotion, as shown by von Lesser's cases, who at the present time are well and healthy and able to walk on their feet, which were perfectly useless to them before.

#### OSTEOCLASIS.

Osteoclasis for correction of deformities has been carefully reviewed and tried in this country by several surgeons, with apparatus imported or modified from either that of Robin or Rizzoli.

Dillon Brown concludes in favor of it in many conditions where heretofore osteotomy has been thought the best and perhaps only resource. He mentions the crude performance of osteoclasis as described by ancient authors, and gives a brief sketch of its history up to the more recent French and Italian perfections of apparatus to substitute the clumsy manual efforts of former times by exact and safe mechanical means. The slow progress of osteoclasis in this country is difficult to explain except on the ground of lack of familiarity; for abroad it has in the hands of many surgeons become routine practice. He points out the great advantages of the simple, exactly placed fracture made by this means over osteotomy, and quotes statistics entirely favorable to the subcutaneous fracture, not only as to mortality, but also to the successful correction of deformity.

Osteoclasis is applicable to all those conditions in which osteotomy might be resorted to: vicious union of fractures; rachitic deformities of the extremities; joint deformities resulting from bony ankylosis; deformities following old dislocations; and occasional obstinate forms of club-foot. In all cases exact mechanical fracture is to be preferred, even where bones could very readily be parted with one's hands; for by the first mentioned method far less risk of injury to vessels, nerves, or of producing compound fracture are run.

He does not resort to osteoclasis in any case until the bones have become quite hard. Before that time such simple methods as splints and moulding easily accomplish a better result than could be obtained by compound or simple fracture.

It has been repeatedly proved that the temporary great pressure which the tissues of an extremity are made to sustain during the fracture of a bone by the lever of the osteoclast does no harm. Also, further, that complete control of the point of fracture is had. In thirty fractures thus made upon the cadaver, by Brown, of the various bones of the extremities, the point of fracture without exception was opposite the pressure pad of the instrument, practically transverse; and only in one case was there any communication.

For bow-legs the writer prefers the osteoclast of Rizzoli as modified by Cabot, of Boston, in which counter-pressure is obtained by means of hooks instead of rings, so that the limb can be the

more readily removed from the instrument if it should become impacted. The instrument consists of a steel bar, through the centre of which runs a heavy screw at one end, furnished with a handle, and the other with a strong, well-padded plate. Two steel hoops, having at their upper portion a slot into which the large bar slides, complete the apparatus.

To perform the operation the patient is anaesthetized and the affected limb placed in the hooks, which are so adjusted upon the straight bar that one comes just below the upper and the other just above the lower epiphysis of the affected bone. The padded plate is brought to bear upon the outer aspect of the limb directly over the point where fracture is desired. After this adjustment the pressure pad is driven down rapidly by turning the screw until the bone gives way. In case of bow-legs the operator must be certain that both bones are broken before removing the instrument; two distinct cracks usually inform him that he has accomplished his object. The after-treatment is simply that of a simple fracture. Separation of epiphysis is to be avoided by careful adjustment of the instrument. More than one case of non-union after osteoclasis is on record.

Senn reports Macewen as having performed subcutaneous osteotomy with the chisel 900 times for genu valgum and varum and curvature of the leg, without a bad result. The line of section in genu valgum and varum is made above the epiphyseal line by selecting as the fixed landmark a finger's breadth above the external condyle of the femur. The small incision for the chisel is made at a point diametrically opposite and in part of the tendon of the adductor magnus, so as to avoid the anastomotica magna artery. In making section of bone he directs that the chisel should be always directed away from the artery. In children suffering from rachitis the operation is postponed until the disease has subsided.

The process of callus-formation proceeds in the same manner as in subcutaneous fractures. After osteotomy the deformity is at once corrected and the limb immobilized the same as after a fracture.

For genu valgum a well-padded splint with a foot-board is applied along the outer side of the limb. This splint is fastened upon a cross-picce to prevent rotation.

## FLAT-FOOT.

The causation and treatment of flat-foot has been considered by Gilbert Barling. He makes no varieties of this deformity, but considers all usual subdivisions as a whole class, for the treatment is almost identical in all. He recognizes three well defined causes of the deformity: (1) nervous inhibition; (2) atony; (3) articular or rheumatic joint change. Practically, all the nervous class are results of infantile palsy which has involved the muscles of the sole and the posterior muscles of the leg. Barling thinks that deformity should either never occur in these cases, if early taken in hand, or at most should be very slight; for massage and proper support by apparatus will usually accomplish all that can be desired.

But though to be avoided when possible, division of tendons must in certain cases be resorted to. If the peronei be divided in these paralytic cases, care must be taken that ends of the tendons shall not be more than moderately separated after division, as reparative material is but sparingly produced and a weak elongated tendon with flail-like movements of the foot will otherwise result. The statical or atonic group owes for its origin faulty adjustment of the weight of the body upon the tarsal arch, combined with laxity of ligamentous tissue and want of healthy muscular tone. Laxity of ligaments will often follow upon lack of muscular equilibrium and development. In this way in a healthy state many parts are maintained in a normal condition unconsciously, partly by muscular tone, partly by ligamentous attachments; and in event of the muscles becoming tired, they relax and then the whole brunt of work is thrown upon the ligaments, which, unequal to the strain, consequently become elongated.

Flat-foot is caused not alone by the yielding of the calcaneo-scapoid ligament, but also by yielding of such other structures as the long and short plantar ligaments, various shorter intertarsal ligaments, the plantar fascia, and, most important, the relaxation of muscles of the leg and sole of foot. In the rheumatic group are gathered such causes as gout, strumor, rheumatism and syphilis. His reason for introducing this group is on account of rheumatism, which is the only one cause in the group the existence of which he believes in. All changes and causes of flat-foot have origin otherwise than in the articular surfaces; all joint changes are secondary.



In his experience the pneumatic group includes the worst cases. A patient after an attack of acute or subacute rheumatism finds upon beginning to go about that the sole of his foot aches after slight exercise, and that there is a tenderness over the astragelo-scaphoid joint; then flattening is noticed, pronation of the anterior portion of the foot follows, and, in some instances, instead of a concavity at the inner side of the sole there is a convexity produced by the head of the astragalus and the hypertrophied tubercle of the scaphoid.

He makes three clinical divisions of flat-foot: simple, rigid, and rigid with bony deformity. The simple flattening of the tarsal arch requires for its treatment care whilst walking or otherwise exercising the foot, attention to the general health and some form of mechanical support to the weak arch, which can be provided by means of well-adjusted pads built into the soles of the shoes and of sufficient thickness to properly raise the arch.

Simple flat-foot if neglected often is the forerunner of the more grave forms of the disorder. Rigid flat-foot is caused by contractions and contractures of muscles and ligaments concerned in the movements of the foot. No more deformity is present than in the simpler forms, but if an attempt be made by flexion and supination of the anterior portion of the foot to reproduce the arch, the effort fails either because the patient suffers acute pain, which, exciting the muscles into action, prevents replacement, or to the shortening of the peronei muscles, the extensors of the toes and the dorsal fascia from adoptive atrophy. What first is required in the treatment of this group of cases is to overcome the rigidity; and for this purpose anæsthesia is to be induced, when usually every thing at once becomes relaxed, although sometimes great force with both hands must be used before relaxation can be induced, perhaps by rupture of ligaments. Tenotomy will be required but rarely. Having by any of these means brought the foot into proper shape the author at once does it up in a position of extreme supination and flexion in a fixed dressing of gypsum.

The plaster case is removed in a longer or shorter time, according to circumstances, and the patient is then treated as for simple flat-foot by means of padded, well-laced, stout shoes, and avoidance of overexertion.

The third class, or those cases in which bony deformity has

occurred is happily a quite limited one,—mostly a sequela of acute or subacute rheumatism. When patients convalescing from the other mentioned forms of this disease complain of pain in the feet in walking, great care must be observed to give ample rest to the parts until recovery is complete and the yielding structures have regained a healthy tone, as by this means even most severe cases may be altogether avoided.

The treatment of this final class is the same as for the second during its earliest stages; but later, nothing short of Ogston's operation of removing the malformed opposing cartilages will prove of any marked benefit. Remove the interfering cartilages of the astragalus and scaphoid; restore the arch of the foot by forcible manipulation and fix the raw bone surfaces in that position by means of ivory pegs. The parts should then be kept immobile for at least eight weeks. Then some weight may gradually be thrown upon the foot.

(T. G. M.)

#### REFERENCES.

1. Pott's Works, London, 1790. 2. London Med. Rec. 3. Med. News. 4. Volkmann's Sammlung. 5. Jour. de Méd. et de Chir. 6. Deut. Med. Zeit. 7. Trans. Liverpool Med. Inst. 8. Bull. d. l. Soc. Anat. 9. N. Y. Med. Jour. 10. Weekly Med. Review. 11. Cent. f. Orthop. Chir. 12. Med. Register. 13. Med. Bulletin. 14. Cinn. Lancet-Clinic. 15. Vratseh. 16. Pacific M. and S. Jour. 17. Provincial Med. Jour. 18. Cent. f. Chir. 19. Med. Chronicle. 20. Med. Register. 21. Revue Méd. d. l. Suisse Romande. 22. Deut. Med. Woch. 23. Wien. Med. Presse. 24. Glasgow Med. Jour. 25. Lancet. 26. Brit. Med. Jour. 27. N. Y. Med. Jour. 28. Senn in Jour. Am. Med. Assoc. 29. Boston M. and S. Jour. 30. Phila. Med. Times. 31. Inter. Encyc. Surgery. 32. New Orleans M. and S. Jour. 33. Münch. Med. Woch. 34. Arch. of Pediatrics. 35. N. Y. Med. Jour. 36. Am. Pract. and News. 37. Trans. Texas. State Med. Assoc. 38. Lancet. 39. Am. Jour. Med. Sci., 1886. 40. Am. Jour. Med. Sci., 1886. 41. Topog. Anat., Vienna, 1853. 42. Jour. Anat. and Phys. 43. Winkelman, Restoring Art. 44. Trans. Am. Coll. Phys. 45. Am. Jour. Med. Sci. 46. Am. Jour. Med. Sci. 47. Am. Pract. and News. 48. Trans. N.Y. Acad. Med. 49. N.Y. Med. Jour. 50. Soc. de Chir. 51. Deut. Zeit. f. Chir. 52. Med. News. 53. Berlin Klin. Woch.

[Undated references apply to journals published in 1887, and original articles can be found by consulting the indexes of the respective publications.]

## GENERAL THERAPEUTICS.

BY WILLIAM PEPPER, M.D., LL.D.,

AND

J. P. CROZER GRIFFITH, M.D.

PHILADELPHIA.

---

IN presenting to the profession the following notes and abstracts from the medical literature of the past year, the writers feel it necessary to state that though they have tried to review the various subjects in as complete a manner as possible, they have confined themselves strictly to the journal articles handed them by the editor-in-chief. If there seem to be therefore any important articles of which no note has been made, it is to be explained by the fact that the articles in question have been properly referred to the editors of other departments. Hence they are not omitted from the ANNUAL, but will be found classified elsewhere. In no other way could an unending repetition of the subject-matter of General Therapeutics and other departments of medicine be avoided. After careful consideration it has seemed to them that the most convenient and most practical arrangement of the different subjects treated would be an alphabetical one,—an arrangement which has also been observed in the department of Experimental Therapeutics. The editors have for the most part avoided the chemistry, physiological action, and toxicology of the different drugs, as these are treated by other editors; and have devoted themselves chiefly to the consideration of the application of the various therapeutic measures in disease.

---

*Acetphenetidine.*—Among the more recent of the modern antipyretics is acetphenetidine,—a compound of acetyl with phenetidine, analogous to the composition of acetanilide. (q. s.) It was discovered and experimented with by Hinsberg and Kast,<sup>1</sup> who administered it in doses of 3–8 grains, and were able with it

to reduce the temperature of the body an average of  $2^{\circ}$  C. without any unpleasant secondary effects. It has been further employed by Kobler,<sup>2</sup> who describes it as a pale red powder without smell or taste, soluble with difficulty in water, but much more easily dissolved in alcohol. He treated 50 patients with it in the clinic of Prof. Bamberger in Vienna. Among other diseases, it was given in tuberculosis, pneumonia, typhoid fever, pleurisy, sepsis, measles, peritonitis and cerebro-spinal meningitis, in doses of 0.6 to 0.7 grams in adults, and 0.2 to 0.3 in children. Its action begins in about 4 hours and the fall of temperature is gradual, commencing about  $\frac{1}{2}$  hour after administration and continuing from 4 to 6 hours. In from 2 to 3 hours the rise of temperature commences, and in about 8 hours the influence of the drug disappears. As a rule profuse sweating is not produced, but it may be developed together with chilliness and subnormal temperature in debilitated conditions, such as phthisis and typhoid. In this particular, then, the drug has no advantage over other better known antipyretics. Cyanosis, collapse or vomiting occurred in no case; no instance of any idiosyncrasy to its use was noticed, and the medicine appeared to have no injurious effect on the circulation, the pulse being diminished in frequency and increased in tension. No diuretic action could be observed, though the medicine has no deleterious action on the kidneys. It was given in a dose of 1.6 grams *pro die* in a case of pneumonia with Bright's disease and bloody urine, and no sign of intoxication appeared, while under its use the blood grew less in quantity. Though it does not, he claims, retard recovery in any way, as is said to be the case with some other antipyretics, it just as certainly has no specific action on the disease. The small dose of the medicine is an advantage, as well as the entire absence of unpleasant taste; while a great disadvantage is its slight solubility in water. Associated with Kovacs, the writers have made some experiments upon the influence of the drug on the growth of bacteria,—at least in so far as its insolubility permitted. No other effect could be observed than a slight delay in the rapidity of growth in the cultures.

*Aconite*—*Aconitine*.—Waitzfelder<sup>4</sup> adds renewed testimony to the usefulness of aconitine. He has employed it externally with great success in neuralgias of various types, with the result of curing or relieving patients who had suffered with facial neuralgias

for varying lengths of time. He has employed it in 3 cases of chronic sciatica,—with decided benefit in 2 of them, but with no improvement in the other after a month's trial. In pachymeningitis, whether syphilitic or not, it was occasionally very useful, in 1 case relieving the pain in three days. In acute congestion of the brain with increased blood pressure from excessive action of the heart, he has found its internal administration very valuable, especially when combined with bromide of potash.

Dumas<sup>5</sup> recommends it especially in neuralgias. It is, however, not without effect in pleurodynia, migraine, and even in articular rheumatism. It should be commenced in small doses, and only increased slowly as tolerance is established.

*Alcohol.*—Under general considerations concerning it we find Flint<sup>6</sup> questioning whether alcohol is ever useful in health. Demme,<sup>7</sup> too, cautions against the common practice of allowing children the habitual use of alcoholic beverages as appetizers, and reports cases of organic and functional disease produced by this habit. He has met, for instance, with 2 cases of cirrhosis of the liver in early life due to this cause. 5 cases of epilepsy in children were induced by their use of alcoholic beverages, and in addition to these he could trace 21 out of 71 young epileptics to parents who were drunkards. Alcohol taken early in life was a prominent factor in the production of night terrors and chorea in some cases. He concludes that the employment by children of alcoholic drinks must be absolutely avoided, except as a therapeutic measure; and then only after the condition demanding it has been most carefully investigated.

As to the employment of alcohol at all, even in disease, the majority of writers seem to believe that it may be a most useful agent, and this is without question our own opinion. Rebecca Hallowell<sup>8</sup> expresses herself, however, as quite positively opposed to its use under any circumstances, and in a lengthy article quotes largely from various writers in support of this position. Flint<sup>6</sup> advocates it in fever on the ground that it supplies material for consumption in the place of the tissues. Demme<sup>7</sup> advises it strongly in children to stimulate the failing heart in the infectious diseases, cholera infantum and asthenic pneumonia. Cleland, Andrews, Maire, and others, at a discussion in the Detroit Academy of Medicine,<sup>9</sup> declared themselves in favor of its use, though the

first would not give it in the early stages of typhoid. Foster<sup>10</sup> argues that alcohol is a valuable agent in the cure of many diseases. That high temperature is not *per se* a contra-indication to alcohol, as many believe, is emphasized by Hare,<sup>8</sup> who would give it to stimulate the flagging power of the stomach in asthenic febrile conditions; though to administer it in large doses for its antipyretic effect is condemned by Demme.<sup>7</sup> Flint<sup>6</sup> further calls attention to its great value in some cases of diabetes, in which he has employed it on theoretical grounds, but with practical advantage. In two hopeless cases of this disease, with lowered temperature, he administered one grain of whisky for each grain of sugar lost, and succeeded thereby in raising the temperature to the normal standard.

*Alimentation.*—Richardey<sup>11</sup> describes a French preparation of condensed beef, reduced to a powder by a new process and sold in the form of tablets. It is pleasant to take, easily digested, does not undergo change if kept, and is rich in phosphates and nitrogenous material. Each tablet contains 20 grams of beef powder, equalling 80 grams of fresh beef. The preparation is useful for anæmic and chlorotic patients, and rapidly renders them able to take other kinds of food. Used by him in the form of 3 soups daily, it caused vomiting and diarrhœa to disappear in 2 cases of advanced phthisis. Senator<sup>5</sup> believes that spermaceti could with advantage be substituted for the oils generally employed when these cannot be administered, as has indeed been done in the case of infants. It may conveniently be given in the form of powder, with sugar ( $\frac{1}{3}$ ), administering 10 to 20 grams of the mixture per day. A second method of using fat consists in giving the pure fatty acids, or, which is still better, the acid already saponified with an alkali, as in the officinal Medicinal Soap of the German Pharmacopœia. As this decomposes in the stomach, it is better to prescribe it in the form of keratinized pills, which will reach the intestines unchanged. He has administered these pills in several cases of diabetes, phthisis, cirrhosis of the liver, etc., and always with good results. In discussing this paper, Liebreich<sup>5</sup> said that the keratin does not protect from decomposition in the stomach, and that in any case he preferred the pure fatty acids to the medicinal soap. Escorileada<sup>8</sup> records an instance of extreme anæmia with anorexia treated with inhalations of defibrinated and

diluted bullocks' blood, given in the form of a spray, as already recommended by Jubini. The dilution was in the proportion of 80 per cent. of blood to 20 per cent. of a 0.75 per cent. salt solution. Visible improvement was noted after 4 inhalations, other previous treatment having been without effect.

Predazzi<sup>12</sup> has endeavored to determine whether spleen had any value as a food in anæmia. He made a mixture of  $4\frac{1}{2}$  ounces of splenic pulp,  $1\frac{1}{2}$  ounces of brandy, and  $10\frac{1}{2}$  ounces emulsion of bitter almonds; the whole to be taken in the course of the day with the meals. 5 patients with chlorosis were treated in this way for from 1 to 3 weeks. The results were: A rapid improvement in health, with an increased number of blood-corpuscles; a rapid and permanent cure of the functional disturbances of the nervous, digestive, urinary and circulatory apparatus; increase of arterial tension and of body weight. At the same time the patients received nourishing diet, so that experiments as to the real value of the splenic pulp are somewhat vitiated.

Concerning the fermented food-beverages, we find Anderson<sup>13</sup> describing his experiments in the manufacture of *koumiss*, and claiming that it must be made with fermenting solutions of sugar or of honey, since these contain the *saccharomyces cerevisiæ*. German yeast does not answer as a ferment, since it gives the substance a taste like bad ginger beer. He prevents formation of thick, dense curds by adding to the prepared milk a few grains of the bicarbonate of soda or of potash. All cream should be carefully removed before the process is commenced. The author further recommends very highly the "koumissized peptones," which are composed of milk almost completely digested by pepsin or pancreatin or both, and then made into koumiss. They are much more digestible and assimilable than ordinary koumiss. Kefir is much like koumiss, but is less alcoholic, less acid and contains more albumin.

The following analytical table shows the composition of milk, koumiss and kefir:—<sup>14</sup>

|                          | COWS' MILK. | KOUMISS. | KEFIR. |
|--------------------------|-------------|----------|--------|
| Albumin, . . . .         | 48.         | 11.2     | 38.    |
| Butter, . . . .          | 38.         | 20.5     | 20.    |
| Sugar of milk, . . . .   | 41.         | 22.0     | 20.    |
| Lactic acid, . . . .     | —           | 11.5     | 9.     |
| Alcohol, . . . .         | —           | 16.5     | 8.     |
| Water and salts, . . . . | 873.        | 918.3    | 905.   |

Lépine<sup>15</sup> considers *kefir* useful in all anæmic and marasmatic states, from whatever cause, and especially so in atonic diseases of the digestive canal. He has employed it with success in several cases of ulcer of the stomach, as it was better tolerated than milk and produced less pain. He also prefers it to milk in the treatment of gastric catarrh or dilatation of the stomach, and considers it incontestably superior to koumiss. It must be noted in this connection that Anderson<sup>13</sup> states that kefir seems to be nothing more or less than a sedimentary deposit of koumiss, colored and sweetened, perhaps to escape detection.

We find *malt* receiving further scientific attention from a few writers. Townsend<sup>16</sup> says that while there is no doubt that the diastase found in malt and in good malt extracts is capable of converting starch into sugar outside of the body, the important question is, will it do this in the alimentary canal? By adding solutions of hydrochloric acid or of pepsin, or of both combined, to mixtures of malt and starch paste in test tubes, it was found that the acid destroyed the converting power of the malt. An experiment was then made upon kittens, giving them certain quantities of starch paste, milk and malt, and killing the animals at certain times afterward. This also showed that the starch was still present in large quantities. The author therefore concludes that malt is only valuable in therapeutics on account of the nutriment which it contains. A glass of beer and a tablespoonful of malt are practically of the same nutritive value as far as the sugar is concerned, while a tablespoonful of Liebig's food contains  $\frac{1}{3}$  as much again of sugar,—the last two, and especially the last, being also superior to beer in nitrogenous material. It seems to us that the author's experiments are incomplete in one very important particular, viz., that healthy men were not given malt and starch on an empty stomach, and the contents removed at definite intervals and tested for starch. There is no certainty that the secretion of acid in man takes place at the same time after eating as it does in the carnivorous animals. Indeed, it is very commonly taught that hydrochloric acid does not appear in the human stomach until about three hours after eating; this time being occupied largely by the digestion of the starchy elements of the diet. Such an experiment would be of interest and would tend to determine conclusively the diastatic value of the malt preparations.



Wallace<sup>17</sup> writes that the inability to digest starch is one of the commonest forms of dyspepsia, and that the principle lying at the foundation of the use of malt is that its diastase will aid in the digestion of starches. It is usually given immediately after meals; but as ptyaline is never found in the human excretions, it seems likely that the excess from the saliva swallowed is reabsorbed, to be again secreted. If this be so, it is probable that we can actually increase the converting strength of the saliva by administering malt; but to accomplish this object, it should be given some time *before* meals. The principal uses of the malt extracts are the following: (1) Taken *before* meals it supplies maltose in a very digestible form for immediate assimilation; and along with it furnishes diastase for absorption into the blood and subsequent secretion by the salivary glands. (2) Taken *along with* the food, it becomes intimately mixed with the starches and aids in their digestion. (3) It may be used to convert starch into sugar before it has been taken into the stomach. The author strongly recommends it in the place of stimulants in convalescence from prostrating illness.

In the department of *rectal alimentation*, we find an elaborate paper by Ewald,<sup>15</sup> which is, however, largely experimental. In general, the following facts were demonstrated: (1) that the rectum has undoubted power of absorption, but that the amount absorbed varies greatly from influences not to be controlled and peculiar to the individual; (2) that the value of an albuminoid for rectal alimentation does not depend on its richness in genuine peptone. Eggs, which contain the smallest quantity of peptone, are as readily absorbed and will give a greater gain to the organism than peptones containing a far larger amount of peptone; (3) that we may produce with unprepared eggs, or still better with eggs that have been treated with hydrochloric acid and pepsin, the same results as are obtained with purchased peptones, and at much less cost.

Quinlan<sup>19</sup> recommends a nutrient suppository composed of extract of beef combined with *pepsina porci* and peptic fluid. At the heat of the body it melts and peptonization takes place.

Sauter<sup>8</sup> prepares peptone suppositories with cacao butter, each containing 25 grains of peptone. In proper cases these serve an admirable purpose, 15 grains of dried peptone equalling  $2\frac{1}{2}$  drachms

of meat in nutritive value. Children may receive 1 four times a day; grown persons 2 three times a day.

*Alveloz.*—Barnsfather<sup>4</sup> calls attention once more to the use of this substance obtained from *Euphorbia heterodoxa*, as a topical application for cancer. He emphasizes the fact that only those specimens are valuable which show that they are absorbed by their action on the kidneys in producing a copious and offensive discharge of urine. In a case of uterine cancer the bleeding was made to cease and the severe pain removed by the topical use of the drug once a day; while at the same time the general health evidently improved. The patient lived 4 months in comparative ease, and died finally of peritonitis.

*Amyl Hydrate (Dimethylethylcarbinol.)*—This substance, belonging to the tertiary alcohols and one of the newest hypnotics, was first studied by von Mering,<sup>15</sup> who administered it in 60 cases. The total number of doses given was 350, varying from 3–5 grams at a time. Most of the patients had been suffering from insomnia from nervousness or mental overwork. Among others was 1 case of delirium tremens, 1 of mania, and several of the insomnia of old age, phthisis, and fevers. 2 patients were suffering from heart disease. Later the drug was studied by Scharschmidt,<sup>15</sup> who employed it in 80 cases with the large number of 1051 administrations, with good results in 869, medium in 138, and no effect in the remaining.

It is a colorless fluid, soluble in 8 parts of water, and with a taste and smell something like that of camphor, with a peppermint-like, cooling after-taste. In power it seems to stand intermediate between chloral and paraldehyde,—2 grams of it equalling in strength 3 of the latter, but only 1 of the former. It is safer than chloral, as it does not depress the heart's action, and is of a less disagreeable taste than paraldehyde; nor does it produce an odor on the breath, as this substance does. It is, like the other two, unreliable in producing sleep if pain be present. Its principal action appears to be on the cerebrum. It does not cause nausea, headache, disturbed digestion or other after-effects, and only in a few instances has it caused giddiness. In only 4 cases in the practice of von Mering did it prove inefficacious. It may be given dissolved in water in doses of 3 grams, or as an enema in doses of 5 grams. In 2 cases of whooping-cough, 2 grams at bed-time

proved valuable. Our own limited experience with the drug fully confirms these statements as to its hypnotic value.

*Antifebrine (Acetanilide).*—Discovered at a time not only when the value of antipyrine had become so greatly appreciated, but when some of its disadvantages were being better understood, antifebrine at once sprang into tremendous popularity. Introduced by Cahn and Hepp, in the latter part of 1886, its employment in medicine has become widespread,—with what advantages and disadvantages, a review of the journals of 1887 may show us. The same authors<sup>20</sup> publish a long paper containing another series of clinical experiments with it, accompanied by charts and temperature curves, and again give a description of the drug. It is a neutral chemical body, produced by abstracting water from acetate of anilin under the influence of an elevated temperature. It forms a light crystalline powder soluble in 25 parts of hot water, and only in 160 parts of cold water, and is quite easily dissolved in alcohol, strong wine or ether. Its taste is slightly burning, but not disagreeable. These writers tested its antipyretic effects in 60 more cases, 29 of which were instances of typhoid fever. Their results were as favorable as before. Regarding the dose, their former opinion is confirmed, that it should be but  $\frac{1}{4}$  that of antipyrine. They begin with 0.25 grams and increase it even up to one gram. It has never been necessary for them to give over 2 grams a day, though much larger quantities have been taken without any injurious effects, and experiments on animals have shown that man must probably ingest from 20 to 30 grams a day in order to produce toxic symptoms. Yet a degree of care must be employed with debilitated patients until we learn the individual susceptibility to the medicine. The drug was generally administered at the time of the rise of temperature, though the greatest effect was observed in continued pyrexia, if given at the time when the temperature began to fall. They much prefer it given in a single dose, rather than the same amount divided into smaller portions, and administered more frequently; and they publish tables to prove that better results are obtained by the former method. A good plan is to reduce the fever by a single large dose, and to keep the patient apyretic with smaller amounts. The authors have observed one case of collapse following its use, and this but slight and temporary, and after an exceptionally large dose. It agrees with the stomach better than

antipyrene and rarely causes nausea or vomiting. If a temperature falls rapidly, there is apt to be shivering when it rises again. Irritation of the genito-urinary tract has never occurred in their experience as a result of the use of antifebrine, or as increased by it. After a sufficiently large dose, the fall of temperature is usually noticeable within an hour. There is redness of the skin and more or less secretion of perspiration; but the authors have never observed any cutaneous eruption except miliaria in occasional cases. If the temperature has fallen greatly, the patients become pale and at times cyanosed; but the last symptom was always slight, and seemed to depend purely on the coolness of the skin, and not on any aniline poisoning. The duration of the antipyretic action is variable, lasting 3-5 hours before the rise of temperature begins. This rise is slow or rapid, the whole period of action of the drug extending over 3-12 hours. Sometimes, as with other powerful antipyretics including the cold bath, the temperature rises slightly above what it was when the drug was given. A very important feature of the drug is the increase which it produces of the general euphory of the patient. The improvement of the general condition after antifebrine, with the greater desire for food and drink, may have some connection with the increased secretion of urine which frequently follows its administration, as is shown by a series of cases under their observation. This increase, always welcome in febrile conditions, could not take place if the organs of circulation were not favorably influenced by it. The pulse is also favorably affected, becoming less frequent as the temperature falls, while the tension rises at the same time. Indeed, experiments on animals have shown that even when injected into the veins, there is not the slightest fall of blood pressure produced.

Anserow<sup>5</sup> also recommends antifebrine as an antipyretic, having used it in 40 cases without observing any depressive effect on the heart. The greatest reduction of temperature was obtained 3-4 hours after the administration of the medicine, and after 6-8 hours it rose again, unaccompanied by chilliness. He admits that a large dose will produce copious perspiration. Osler,<sup>21</sup> too, has made a series of clinical experiments on the antipyretic action of antifebrine in 29 cases of various febrile disorders. It was usually effective, but his experiments show the influence of personal idiosyncrasy upon the action of different drugs. In one case of

erysipelas, for example, where antipyrine with large doses of quinine had no very marked effect, 8 grains of antifebrine reduced the temperature  $7.6^{\circ}$  F. in  $2\frac{1}{2}$  hours. In another instance, a case of pneumonia, where 8 grains of antifebrine had failed 6 times to reduce the temperature, 4 grains of thalline twice brought it down 3 and 4 degrees, and the cold pack had a still more powerful action. Vomiting or collapse was not observed, and chilliness only once. A most disagreeable symptom was profuse sweating, which almost invariably occurred, the combination of the drug with atropine having but little effect in preventing it. The pulse was diminished in frequency and increased in tension; and probably as a consequence of the latter, the secretion of urine was largely augmented in some cases. The general condition was improved.

Among the secondary effects, Snyers<sup>22</sup> mentions vertigo, ringing in the ears, perspiration, and chilliness of varying intensity. He has never observed cyanosis or diuresis. He considers the fall of temperature to be more sudden than after antipyrine, and that antifebrine is more apt to produce profuse perspiration and chilliness, while the temperature rises again more rapidly. He clearly prefers antipyrine to it. Müller,<sup>22</sup> on the other hand, never gives antipyrine without alcohol to ward off collapse, but takes no such precaution with antifebrine. He finds that patients rapidly become accustomed to the drug, and that the dose needs to be doubled or tripled; but that after 24 hours' intermission, it regains its original power.

Secretan<sup>23</sup> has used it in 12 cases of febrile affections, for the most part with good results. The temperature commenced to fall soon after a dose of 0.25 grams, but deffervescence had not reached its greatest degree for 3 hours or sometimes 5–6 hours afterward, when the reduction equalled  $2-3^{\circ}$  C. or even more. Its action was therefore like that of antipyrine, and not so rapid as that of kairine or thalline; but when the minimum is reached, the temperature rises again sooner than after antipyrine. Differing from Snyers, he believes that patients do *not* grow accustomed to its use. The drug often produced profuse perspiration, sometimes as soon as 5 minutes after its ingestion; and this lasted longer, it seems, than after antipyrine. It sometimes caused a sensation of prostration with paleness and cyanosis, which appeared dangerous, but was

not so in reality. The pulse was diminished in frequency and its force increased, just as with antipyrine. In 2 cases there was genuine collapse, and in 2 a decided rigor. Contrary to the experience of many, disturbance of the digestive apparatus has occurred oftener, he thinks, than after antipyrine,—the medicine causing sometimes nausea and even vomiting. The dose employed is rather large, 0.5 grams being the minimum, and 2 grams being frequently given to typhoid cases.

Weill<sup>24</sup> considers antifebrine a most active febrifuge; that it rather diminishes the flow of urine; and that tolerance is set up by uninterrupted, prolonged use. Demiéville<sup>23</sup> has never known it to produce rigors or noises in the ears, but has seen it cause giddiness and perspiration, and in one case delirium and hallucinations resembling those following salicylic acid. It only seldom disturbs digestion and induces nausea and vomiting and possibly diarrhœa. In 1 case lachrymation and a pricking sensation about the eyes were complained of after large doses had been taken. Faust<sup>25</sup> has had a somewhat extended experience with the antipyretic action of the drug, having used it in 72 cases of different febrile affections.

The first dose should never be larger than 0.25 grams, and in children it is always best to give as many centigrams as the patient is years old. He found the temperature of typhoid fever and of phthisis most easily influenced, and noticed in addition that the higher the fever the more energetic was the drug's action. It also seems that a certain degree of tolerance was established by its continued use, but that the subject became as susceptible as at first when the medicine was not given for some days. Rather profuse perspiration accompanied the fall of temperature. The maximum of the reduction was reached in from 3–4 hours, and equalled as a rule at least 2° C. The lowered temperature continued then the same for 1–2 hours, and rose slowly, or sometimes rapidly, the entire course lasting 6–10 hours before the former elevation was attained. When the rise was rapid, chilliness was usually noticed. Though the fall of temperature was often very great there was no instance of collapse observed, and the pulse always remained good. He confirms the experience of others that antifebrine increases the tension of the pulse. He has frequently noticed the tendency to cyanosis, and does not believe it is due to the action of aniline, but

to a dilatation of the vessels beneath the skin,—his views coinciding in this particular with those of Lépinc. He has observed no *tinnitus aurium* or diarrhœa following the employment of antifebrine, nor vomiting, except in one case where it was entirely accidental; nor has he seen any cutaneous eruption or increased renal secretion. Lépinc<sup>26</sup> contributes a long article upon this drug, chiefly of an experimental nature, and supplementary to the one published by him in 1886. He attributes no importance to the cyanosis, and remarks that it should not alarm a physician. It may be due to methæmoglobin in the blood, though he doubts this and says that even if true there is no destruction of the corpuscles, and that the methæmoglobinaemia rapidly disappears. It is probable that conditions of the submucous vascular network are important factors in producing the cyanosis. Heintzelmann's<sup>27</sup> results have been in the main good, the drug in doses of 0.25–0.50 grams reducing the temperature promptly in most cases, and being well borne by the stomach. The greatest fall occurred 2–4 hours after taking the medicine.

Weinstein<sup>28</sup> has seen no chill or collapse follow its employment, and states that the fall of temperature which it produces continues some considerable time. However, it frequently causes excessive perspiration, though even then the patient feels better than with the weakness resulting from the fever heat, which also prevents quiet sleep.

Taking up now the application of antifebrine in special affections, we find considerable matter published in regard to its value in typhoid fever. Cahn and Hepp,<sup>29</sup> who report 29 typhoid patients treated by antifebrine, speak of the way in which a dose of it will at times cause a disappearance of the stupid facial expression and a straightening up of the body, which had been sunken down in the bed. They could, however, discover no specific action of the medicine on the disease, though the antipyretic action was marked. Secretan<sup>23</sup> appears to prefer antipyrine to antifebrine in typhoid, because the action of the latter is not of so long duration. After a dose of antifebrine, say at 11 A.M., the temperature, it is true, falls; but at 10 P.M. it has risen again, and the patient has a less comfortable night than if antipyrine had been given. He dares not affirm that it has any specific action on the disease.

Whittaker<sup>3</sup> has reported an interesting case of intestinal

hæmorrhage, in the fourth week of typhoid fever, with sudden rise to over 104 degrees, in which he feared to use the cold pack, and where quinine had had no marked effect. Here the administration of 5 grains of antifebrine reduced the temperature to 98.5° F. He believes that if the fever had not been diminished the patient would have died from the action of hyperpyrexia upon the heart. Faust,<sup>25</sup> who treated 29 cases of typhoid with antifebrine, reports the interesting experience that when the temperature rose rapidly and was accompanied by chill—as it did in 6 cases—he was able to prevent this rise entirely by giving a second dose of the medicine just as it was beginning. In this way the apyrexia was prolonged, and when fever did come again it developed gradually and without chilliness. He also noticed that the chilliness following a cold bath in typhoid patients might be entirely averted by the administration of a small dose of antifebrine immediately after the patient had been dried. He was especially pleased with the action of the drug in this disease. The patients felt better after its administration, the expression became more intelligent, the tongue cleaner and the appetite improved. It does not, however, prevent relapses, nor does it seem to possess any specific power. Heintzelmann<sup>27</sup> concludes that typhoid fever is not rendered milder by the use of antifebrine. Lépine<sup>26</sup> has treated 20 cases with antifebrine, giving a dose of 0.50 grams when the temperature was above 38° C., and a second dose in 15–30 minutes if it was above 38.5° C. The period of the disease should be taken into consideration. He believes it is of great advantage to spare the patient as much as possible any great elevation of temperature.

In the treatment of rheumatism, we find considerable difference of opinion as to the value of antifebrine and its possession of specific power. Secretan<sup>23</sup> reduced and kept normal the temperature of a case of rheumatic pericarditis by doses of 0.50 grams given every 2 hours, but he does not state with what other good effects. In 2 cases of rheumatism he was unable to produce any mitigation of pain or reduction of temperature, while in 2 others treated later the beneficial effects, both on pain and temperature, were striking. Calm and Hepp<sup>20</sup> do not believe that it exerts any specific action on the disease, except in so far as it and all other drugs which allay the pain and reduce the temperature may be called specifics. Faust's<sup>25</sup> early experience with antifebrine in



rheumatism was not favorable, but his later trials with larger doses (0.5 grams every 2 hours) in about 12 cases, have been attended by success. It reduced the temperature and pain, and though with profuse perspiration, yet without the ringing in the ears which accompany salicylic acid. It did not, however, prevent relapses in the slightest degree. Weinstein<sup>27</sup> considers it a specific in acute rheumatism, like salicylate of soda, if used in fresh cases and not in relapses. Its action is prompt and the swelling and pain disappear quickly after a few days. Pavai-Vajna<sup>21</sup> assigns it equal value with salicylic acid.

One of the most important papers on this subject is that of Eisenhart,<sup>27</sup> who has tried it in 34 cases of acute articular rheumatism in doses of 0.25 or sometimes 0.50 grams 3-6 times a day. After the first dose, pain and fever usually disappeared and the swelling began to decrease; and in 3-5 days convalescence was established. In only 5 cases was the treatment without effect; 3 of these improving under salicylate of soda, but the other 2 not being helped by it. Relapse occurred in 4 instances, and was cured by antifebrine. In 17 cases the heart was already involved when treatment was commenced; while of the other 17, 3 cases developed cardiac lesions while under treatment. He concludes that antifebrine can by no means supplant salicylic acid, but that it may be used with satisfaction in those cases where the latter is not well borne. Faldella and Poutta<sup>12</sup> think antifebrine is always inferior to salicylate of soda. Lépine's<sup>26</sup> results in a large number of cases have not been bad, but are certainly inferior to those obtained with salicylate of soda, salol or even antipyrine. Snyers<sup>22</sup> has been especially pleased by the action of antifebrine in 5 cases of acute articular rheumatism, and attributes to it a specific action against the articular swelling. The inflammatory symptoms in these cases disappear on the second day after giving 6-8 doses per day of 0.25 grams each. In vigorous persons with intense symptoms, larger doses were employed. After convalescence had commenced, the medicine was continued in doses of at least 0.75 grams per day.

Antifebrine is favorably reported upon in its action in *various other febrile affections*. Murray<sup>13</sup> speaks of its antipyretic effect in 3 cases of meningitis, bronchopneumonia and pyelonephritis respectively. He used a large dose (15 grains) every time the temperature reached 101° F.,—a degree of elevation of temperature

which rarely calls for antipyretic treatment. Cunningham<sup>13</sup> gave it in a case of congestive headache with a temperature of 106.3°, with good effect. He pronounces it absolutely safe,—an opinion not to be recklessly adopted, as later events have shown. Out of 200 cases collected by Eisenhart,<sup>27</sup> in the early part of 1887, only 5 were not affected by the drug, one of these being a case of pneumonia, a patient of Huber,<sup>29</sup> who received 4.5 grams daily, but without any reduction of fever. It should be stated, however, that antipyrine (4–5 grams) was also valueless in this instance. Favorable results are reported in pneumonia, measles and other affections, by Faust.<sup>25</sup> From India we have reports from Sanders, Birch and others<sup>30</sup> of its employment in bronchitis, pneumonia, remittent fever, etc. Birch found both it and antipyrine to fail in reducing the temperature of puerperal fever. A case of sunstroke with an axillary temperature of 107.6° F., was successfully treated by Ward<sup>31</sup> with ice to the head and body, stimulants, and 10 grains of antifebrine hypodermically. A case of erysipelas and several of pneumonia were also treated with good results, so far as reduction of temperature was concerned.

Sexton<sup>3</sup> reduced with it the high fever and removed the break-bone pains, headache, and all the unpleasant symptoms of a patient with fever and ague, while quinine prevented further paroxysms. Widowitz<sup>2</sup> has used antifebrine in 54 cases of diseases of children, including especially scarlatina, measles and pneumonia. In all the temperature began to fall 20–30 minutes after giving the medicine, this fall being less in scarlatina and erysipelas than in measles and pneumonia. The pulse was not always reduced proportionately to the fall of temperature, but it increased in tension and the respirations grew more regular. Children of 3–4 years of age received a dose of 0.10 grams. The general effect was also beneficial, the excitement being replaced by quiet sleep, and the whole appearance being changed in some cases which were apparently moribund. But the drug had in no case any effect on the duration of the disease; and in some patients with pneumonia slight cyanosis was observed.

Last year Lépine had a case of malaria cured by acetanilide, and this year he has had a case<sup>26</sup> of intermittent fever in which the paroxysms were made to cease by the use of the drug. It is necessary to employ a sufficiently large dose (3 grams), and to

give it a little before the hour when the paroxysm would probably appear. His experience has been too limited to enable him to determine how effectual it would be generally in malaria.

Cahn and Hepp<sup>20</sup> do not consider it a specific in erysipelas, though it usually promptly reduces the fever. In a case of malaria, too, it failed to cure, while quinine stopped the chills. Osler<sup>21</sup> found it an effectual antipyretic in all his cases of erysipelas. Papadakis<sup>5</sup> has administered antifebrine with success in 15 cases of intermittent fever, where quinine had proved useless. Not only did the fever cease, but in 11 cases the disease entirely disappeared. He gave 1.20 grams in divided doses during 4 hours. Concerning the employment of antifebrine in phthisis, Cahn and Hepp<sup>20</sup> were frequently able to avoid the evening rise of temperature by its use, and the medicine seemed to prevent the fever from reaching the usual elevation on the following day. Secretan<sup>23</sup> found the antipyretic action of antifebrine marked in tuberculosis. It failed at no time in the cases in which he employed it, but its action was not of long continuance. The temperature in one instance fell to 34° C. Night sweats were not augmented by its use. Cunningham<sup>13</sup> found that when given in doses of 15 grains every twelve hours to a case of phthisis, the profuse night sweats increased for the first two days, then diminished, and by the fifth day had entirely ceased; and the pulse and temperature then remained subnormal, though only one dose per day was taken. Pavai-Vajna<sup>21</sup> thinks it to be superior to quinine in phthisis, and in some instances better than antipyrine. Though giving usually large doses in other affections, Lépine<sup>26</sup> recommends that antifebrine be used with caution in this disease, in which it is to be feared that it may cause collapse. Osler<sup>21</sup> says it proved valuable in a dose of 8 grains, when the temperature was above 103° F.; the results being much better and the patients feeling more comfortable than when 4 grains were administered 4-5 times a day. It did not increase the night sweats, and indeed in one instance diminished them, and the patient's general condition was improved. Snyers<sup>22</sup> reports that it produced profuse sweating, with a rapid fall of temperature. Müller<sup>22</sup> has also treated about a dozen cases with it, and has been able, with 0.25 grams given in the forenoon or toward noon, to maintain the temperature at nearly normal for the rest of the day.

But without doubt the point of view from which antifebrine has attracted the most attention during the year is that of a nervine and anodyne. In 1886, Lépine wrote extensively of this property of the drug; and during the past year he again recommends it<sup>26</sup> for quieting the pain of neuralgia or of tabes, believing it to be certainly as good as antipyrine for this purpose, while it is more easily borne by the stomach. He has been successful in the treatment of the *crises gastriques* of ataxia, and in neuralgias of various parts. A rebellious case of chorea in a child was also benefited by antifebrine; and though not, it is true, to so great an extent as by chloral in large doses, yet without the loss of appetite which the latter drug induced. He was further successful with a patient with *petit mal*, to whom two grams per day were given daily. He considers the drug a sedative to the nervous system, and suggests its use in the opium habit at the time when opium is stopped. Faure<sup>5</sup> has made researches concerning the action of the drug, and has administered it during about  $2\frac{1}{2}$  months to 5 cases of essential epilepsy. The dose varied from 1 to 2.75 grams daily. The number of attacks was decidedly greater than that in the corresponding portion of the preceding year, or in the months immediately preceding the new plan of treatment. The medicine was always well borne by the patient, but always produced a very marked cyanosis of the face and extremities, and the secretion of urine was slightly increased. He considers that antifebrine has no curative power in this disease.

Salm<sup>32</sup> has tried it in 11 cases of epilepsy without favorable results. Secretan's<sup>23</sup> success with antifebrine as a nervine was not very brilliant. 2 cases of acute sciatica were not benefited to any marked degree; 1 case of neuralgia was relieved and finally cured, and 1 not helped at all. Silva<sup>33</sup> reports an instance of intense headache at the menstrual periods where bromides, aconite, gelsemium, atropine, etc., had failed on former occasions. 8 grains of antifebrine were administered in capsules, and a second dose given after 20 minutes. Though with cyanosis of the lips and finger nails, the headache was removed within less than an hour. A second case, one of opium habit, with intense neuralgia of several nerves, was also benefited; as was a third, one of supra-orbital neuralgia, which had resisted other treatment. Dujardin-Beaumetz<sup>24</sup> commends its action in diseases of the nervous system

For pain in general, it is often valuable. Thus, though inferior to aconite in facial neuralgia, yet when structural changes of the nerve are going on, it is the best remedy in our possession. In muscular rheumatism and neuralgia and in articular neuralgia it is better than the compounds of salicylic acid. In epilepsy it is sometimes remarkably useful, though its employment is too new to admit of any positive conclusions. He also employs it with peculiar success for the pains of locomotor ataxia.

These results have been confirmed by Demiéville,<sup>23</sup> who shows, in a long article with reports of cases, that relief from pain began to be experienced within  $\frac{1}{4}$  hour after the ingestion of the medicine, though generally a longer interval elapsed before it is obtained. He has given antifebrine in sciatica and other neuralgias, as well as in other painful conditions and in epilepsy. He noted also its hypnotic effect, which makes it valuable where there has been sleeplessness with the pain. He considers antifebrine a very serviceable anodyne, though sometimes these effects are only temporary, and the medicine must be continually renewed until a complete cure is effected in 2 to 3 days. It is especially to be recommended for the agonizing pain of senile gangrene and of cancer; and in 5 out of 6 cases of epilepsy, the frequency of the fits was diminished by its use. He advises it also in hysterical attacks, and in infantile convulsions. Weinstein<sup>28</sup> has used it in only 3 cases of nervous disorders, but considers it valuable. To Schaufler<sup>34</sup> it has been very serviceable in the relief of pain in the head and back in fever, and to a degree which was not to be explained simply by reduction of the elevated temperature. The effect was so marked in many cases that the patients insisted on calling the dose "morphine capsules," or their "pain medicine." Hamilton<sup>4</sup> has found antifebrine in doses of 3 to 8 grains useless in habitual insomnia, but beneficial in the wakefulness of general disease, especially where it is attended by high temperature. It appears to be valueless or even hurtful in epilepsy, except in the light cases of *petit mal*, in which it has diminished the number of attacks of unconsciousness, especially when combined with antipyrine. In migraine it was sometimes beneficial when antipyrine failed, and the converse of this was also true. Fischer<sup>27</sup> details the result of his employment of antifebrine in the lancinating pains of 10 cases of tabes, on whom 80 to 90 observations were made.

Only one failure was observed among the 10 cases, and in the others its action was decided. He believes the drug to be almost a specific for the lancinating pain, painful crises, and girdle sensations of tabes. Large doses, even up to 2 grams, are generally required, and the effect is to be expected in from  $\frac{1}{2}$  to  $1\frac{1}{2}$  hours after the administration of the first dose. He has also found it useful in chronic neuralgias, hemicrania and headache from various causes.

As an antiseptic it has proved of little value, though Cahn and Hepp<sup>20</sup> say that trial made with it in this direction showed that milk will not become sour nor syrup ferment when saturated with it, and that a  $\frac{1}{2}$  per cent. solution will keep an equal part of a beef infusion from undergoing any change. Yet they state that Lucke has tried it for surgical dressings with no success, owing to its insolubility and the difficulty of applying it properly.

Van Leer<sup>35</sup> confirms the observation concerning the preservative action of the drug upon milk and albumin, but says that it does not form a good dressing for wounds, as it becomes moist with difficulty and seems to be irritating. Tested upon several kinds of bacteria, it proved unable to check the growth of many of them. He says it is not likely, therefore, that it will prove of any value in surgery. Lépine<sup>26</sup> found that it acted with moderate power upon microbes, but to a much less degree than many other antipyretics, notably quinine.

That antifebrine, even in large doses, is not the entirely harmless agent which it was claimed to be, has already been indicated in the articles already quoted, and we append some of the more unfavorable criticisms which have come to our notice. Though certainly biased by his predilection for antipyrine, Sée's<sup>36</sup> opinion, which is throughout unfavorable to antifebrine, may with advantage be kept in mind while reading the many glowing accounts of the drug. He acknowledges its value, but says it is difficult to manage; being powerless in less than 0.50 grams, and poisonous in doses of 1.05 grams. It is dangerous because it produces changes in the blood and a livid color of the skin, resembling the tint of asphyxia. Vineberg<sup>4</sup> reports a case of typhoid where 10 grains were given every 4 hours, producing no reduction of temperature, but great cyanosis, a weak compressible pulse of 116, pinched features, and great general weakness. Sexton<sup>3</sup> tells of a

patient with acute miliary tuberculosis, where 30 grain doses of antipyrine had failed, and where 10 grains of antifebrine reduced the temperature from  $105^{\circ}$  to  $102^{\circ}$  F. 5 grains more were given, which were followed in 2 hours by cyanosis of the whole body, profuse sweating, subnormal temperature and collapse. Pavai-Vajna<sup>21</sup> states that in weak patients a dose of 0.25 grams may produce collapse, while in some cases 1 gram has no effect at all.

Faldella and Poutta<sup>12</sup> have administered it in 60 cases, nearly all of them subjects of some febrile disease, and conclude that it is a powerful antipyretic, but may produce collapse after doses of varying size, depending on the susceptibility of the individual; that it exercises no specific action on acute febrile affections, and does not prevent relapses; that in many patients the fall of temperature is accompanied by an increase in the frequency of the pulse, with a diminution of its strength; and that it has no diuretic action. Dulácska<sup>12</sup> believes its employment is never without danger; and apart from the sweating and adynamia, it may, through its powerful action on the vascular system, induce cyanosis or dangerous hæmorrhage. He reports 2 cases where hæmorrhage was produced probably by the drug. Biró<sup>12</sup> also condemns it as liable to cause sweating, rigors, cyanosis, irregularity of the pulse and collapse; and reports one case of chronic convulsions, such as are seen in aniline poisoning.

Another writer<sup>37</sup> details a case illustrating the dangers which may follow the employment of antifebrine. The patient by mistake took  $7\frac{1}{2}$  grains hourly till 30 grains were taken, reducing the temperature to  $95^{\circ}$  F., and rendering him almost pulseless; and from this state of collapse he was only extricated after 6–7 hours of stimulating treatment. The same writer has used the drug largely and has found it beneficial in malarial fever, but only as an antipyretic, and not as an antiperiodic. He has seen the course of no disease at all shortened by its use; and indeed in one case permanent improvement only began after antipyretic treatment had been stopped. Still another case proving its capability of becoming dangerous is that of Trost,<sup>34</sup> where by an error a patient with intermittent fever took 8 grains of antifebrine every 2 hours, and went into a state of profound collapse with cyanosis, from which he was with difficulty recovered. Cesari and Buroni<sup>12</sup> also call attention to the fact that in large doses its action is

analogous to that of aniline. Finally, death from antifebrine occurred in the practice of von Quast,<sup>12</sup> where a child received through the father's willful disobedience of the physician's order, 4 grains every 2 hours during the day. By evening it was cyanosed and in extreme collapse, and died in spite of all efforts for its recovery.

Our own experience with antifebrine has been very favorable as regards its power of reducing temperature, which it does with comparative certainty and rapidity. It certainly is, however, liable to produce profuse perspiration, and sometimes rigors. In typhoid fever, all chemical antipyretics should be used with caution, since it is exceedingly easy to depress the strength in this disease by doses which would be harmless in certain other sthenic affections. Equal or greater objections, though of a different nature, apply to the cold pack. The advisability of using antipyretic treatment at all is questioned by many. The mere occurrence of a temperature of 105° F., if not continued, is not necessarily a matter of import, or requiring any special treatment. Where, however, danger portends from the hyperpyrexia, antifebrine or one of its congeners becomes most valuable; but its employment for a temperature under 103 degrees is rarely to be advised in the course of the continued fevers. It has, indeed, been claimed, and statistics would indicate with some reason, that the continued use of antipyretics may even retard recovery in typhoid fever, pneumonia or other affections. In phthisis, too, antifebrine is liable to produce profuse perspiration, and nothing is to be gained by its administration, if this result attends a reduction of temperature. Yet we have frequently been able to greatly diminish the usual sweating or suppress it altogether by administering a small dose of the drug before the evening rise of temperature occurred. In rheumatism it has occasionally proved of benefit, but cannot, we think, supplant the salicine preparations, except where danger threatens from great hyperpyrexia. We have frequently found antifebrine of benefit in reducing pain, but its action is uncertain. In epilepsy we have employed it, but were never sure that it was followed by good effects. On the other hand, it did produce great cyanosis when given in large and continuous doses. Although we have yet to see any evil results produced by antifebrine, still it nevertheless seems certainly proved that the drug may be dangerous



under certain conditions; and it does not yet seem to have been satisfactorily demonstrated that the cyanosis is not due to some deleterious alteration of the blood.

*Antipyrine.*—The antipyretic action of this drug is so well understood that we find but little published concerning it during the year. Guitéras<sup>38</sup> considers it worse than useless to persist in the administration of antipyrine for many days in the course of the continued fevers of warm countries; and he has frequently found that its discontinuance was followed by a regular reduction of the temperature, with improvement of the other symptoms. He also noticed that the heart was weaker and the arterial tension less while antipyrine was being administered. Minot<sup>38</sup> gave antipyrine and thalline in 24 cases of typhoid fever, finding that 20–30 grs. of the former was needed. (For further notes of Minot's paper, see "*Thalline*.") Robison<sup>39</sup> failed to cut short typhoid fever by its use. Gradle<sup>39</sup> has found it valuable in doses of 4 grs. in the fever of dentition in infants, where there was a possible danger of convulsions. Scott<sup>21</sup> obtained good results from it in 2 cases of puerperal fever, as well as in 4 of malarial fever. An editorial writer<sup>12</sup> mentions the rapid reduction of a temperature 107.5° F. in a case of malarial fever, though he does not consider that the drug is any thing more than a simple antipyretic in this disease.

As regards phthisis, we find Patrick<sup>39</sup> declaring it very valuable in a few cases in which he has tried it, giving a dose every afternoon. Laache<sup>35</sup> made a special study of its action in phthisis, and found that it, as a rule, brought down the hectic fever very satisfactorily. Olikoff<sup>35</sup> confirms the reports in several journals concerning the hæmostatic action of antipyrine. In 6 cases of hæmoptysis he has employed a solution of 90 grs. in 6 ounces of water, used by inhalation, and has ordered 5–6 inspirations through the inhaler every  $\frac{1}{2}$ –1 hour, diminishing the hæmoptysis at once, and soon arresting it entirely. Snyers<sup>22</sup> has made trial of the comparative value of antipyrine, antifebrine, thalline and kairine, and much prefers the former. The defervescence, he says, is less rapid, and a subsequent rise slower and more regular; hence there is less abundant perspiration and less chilliness. Müller<sup>22</sup> agrees with this statement, but claims that the slower rise after antipyrine does not always take place, and is sometimes even more abrupt than after antifebrine.

Taking up now the employment of antipyrine in rheumatism and as a nervine and anodyne, by far the most important articles during the past year have been the communications of Germain Sée. In the first<sup>40</sup> he states that it is its action in afebrile conditions which has now become of most interest to us; and that this can be well seen in painful rheumatic and gouty affections, or better still in nervous diseases accompanied by pain. In 5 cases of subacute rheumatism in which the actual cautery or salicylate of soda had been of no avail, the pain and swelling of the joints disappeared in a few days under the use of antipyrine; and without relapse if a smaller dose was continued for about a week. The same good effects were observed in acute attacks of gout; 4-6 grams causing the pain to cease in 2-4 days, without producing any injurious effect on the heart or kidneys. But it is especially in nervous affections of sensation that antipyrine has the greatest influence. A series of 4 cases of facial neuralgia, 6 of migraine, and 4 of headache from other causes illustrates with but one exception the power and rapidity of action of the drug. Almost all of a second series of 18 cases, comprising sciatica, neuritis of other parts, lumbago, and general dorsal pain, yielded promptly to the treatment. Further, the persistent and rebellious pains of 4 cases of locomotor ataxia were relieved by its use, though in a fifth case both it and antifebrine were inefficient. The cardiac pains in 6 cases of angina pectoris and 3 of aneurism were removed by 4-5 grams of antipyrine. In all these cases at least 3 grams, but never more than 6, have been required, given in doses of 1 gram at intervals of 1-4 hours; and in this way no prejudicial effects were observed, except in febrile states where profuse perspiration and dangerous lowering of the temperature sometimes developed. The occurrence of vomiting or nausea may be obviated by measuring the doses by decigrams, instead of giving a full gram.

In a second communication<sup>40</sup> he advocates the use of the drug by hypodermic injection, thus increasing its effect and avoiding any irritation of the stomach. As compared with morphia, it is not followed by nausea, vertigo, or somnolence, or by the unnatural excitation which may lead to the morphia habit. He has practiced this method in a large number of cases, sometimes combining the internal employment of antipyrine with it. Thus numerous cases of acute and chronic rheumatism and chronic gout, and a very

painful case of acute gout, were signally benefited. 3 cases of tic douloureux, 1 of them lasting several years; 3 of zona, one of which had lasted 12 years, and other cases of lumbago and of migraine were cured. Cases of locomotor ataxia, who had previously taken injections of morphia, were able to do without them, using in their place 3-4 grams of antipyrine daily by mouth and 1 subcutaneous injection. In a case of hepatic colic, antipyrine hypodermically relieved the pain quite as well as morphia, without diminution of the biliary and intestinal secretions which morphia causes. In 2 cases of renal colic, a favorable result was obtained without arresting the secretion of urine as morphia does. In painful affections of the heart, and in angina pectoris, hypodermic injections of antipyrine can and ought to be substituted for those of morphia.

In asthmatic oppression and severe attacks of suffocation, antipyrine has relieved without suppression the bronchial secretion, but it should be reserved for the acute paroxysms when iodide of potash has lost its power, and when morphia acts only in large and repeated doses. There is, indeed, hardly a morbid condition in which antipyrine hypodermically may not replace morphia, and we thus have at our control a means of avoiding the production of the fatal morphia habit.

In a third communication<sup>5</sup> Sée discusses the action of antipyrine in certain forms of headache, and especially in the "cephalgia of growth," seen usually in children at school, and which develops whenever any mental work is done, and often seriously interferes with the patient's education. It is a constant frontal pain, increased by the slightest effort at intellectual work. It differs from migraine, which is always hemicranic, besides being accompanied by disturbance of vision, nausea and vomiting; from facial neuralgia, which is localized in the facial nerve; and finally from the headache of anæmic or chlorotic children, in which there is paleness of the skin, murmurs in vessels of the neck and in the heart, and a diminution of hæmoglobin in the blood. After having observed a number of cases, Sée was struck with the common coincidence of cardiac hypertrophy. In children of 7-8 years, the heart's growth remains almost stationary, but from 15-20 years it grows rapidly, and may even undergo a physiological hypertrophy. These headaches might then be called "cardiac cephalalgias." In 12 such cases of cardiac

headache of from 13–19 years of age, who had been treated in the usual manner without avail, he was able to relieve the pain within 3–4 days, and to make it disappear completely after 6–8 weeks, by simply administering 3 grams of antipyrine per day. All the 12 were students, 7 being diligent, the other 5 not at all so; so that the study does not seem to have been a cause. In another class of headache—migraine—he has also found antipyrine valuable, having administered it in 42 cases. A dose of 1 gram was given, followed by another an hour later. In all but 4 cases, who were unable to bear the medicine, the results were surprising; the symptoms diminishing in 20–30 minutes after the first dose, and disappearing entirely after the second, which was not always needed. He states that of 7 very severe cases of *tic douloureux* 2 were entirely cured by hypodermic injections of antipyrine, 1 was absolutely resistant to the treatment, and 4 were greatly improved and are still improving. These 4 patients had been unable for from 12–18 years to completely separate the jaws or fully open the lips, or to talk, or chew solid food, or swallow too hot or too cold liquids; nor did they obtain the slightest relief through morphia or salicylate of soda. They took 5 grams of antipyrine daily, together with hypodermic injections of the drug, and after 2 months were able to enjoy comfort not known before, and to live as did the other members of their families. As the injections proved painful, the author modified the formula somewhat, dissolving 0.50 grams of antipyrine in 1.50 of water; or 0.01 grams of cocaine was added to a solution containing equal parts of antipyrine and water.

In another<sup>41</sup> communication Sée details still further his favorable results with antipyrine in pain. He claims that although salicylic acid is certainly superior in acute febrile articular rheumatism, antipyrine as clearly surpasses it in the afebrile form. 30 cases treated by the combined hypodermic and internal administration of the drug always insured immediate relief of the general and local pain, and recovered the ability to move in 24 hours. The internal use of antipyrine should be continued for 10–15 days in doses of 3 grams a day. It is no more infallible than are other remedies, nor does it have any action on endo- and pericarditis already present; but it tends to prevent the advancement of the disease from the joints to the heart. He considers that antifebrine offers no superiority to it, and is, moreover, more dangerous (see

Sée on *Antifebrine*, this ANNUAL); that salol is inferior to both of them, and that salicylic acid is the best in the febrile states, but has disadvantages which antipyrine has not. All of these act in acute rheumatism in different degrees, but none of them are of value in the treatment of chorea. Sée has also tried antipyrine as a nervous sedative, giving it in epilepsy and other convulsions, but without the slightest success.

Todorsky<sup>42</sup> treated 13 cases of acute articular rheumatism by 20-grain doses of antipyrine 4–6 times a day. In nine moderately severe cases, convalescence set in on the 2d or 3d day of treatment; in 1 patient a week elapsed before recovery began; in 2 cardiac complications developed, and in 1 the medicine had not even an effect upon the temperature. This case was, however, an exceptionally severe one, ending in suppuration of the joints, pyæmia and death. In 8 cases of chronic muscular and articular rheumatism, pain disappeared after 3–4 days of treatment, and if it returned, it again rapidly yielded to the drug. Root<sup>16</sup> reports a case of acute rheumatism relieved by antipyrine, after salicylate of sodium had proved ineffectual. Hirsch<sup>20</sup> tells of several cases of rheumatic pain relieved promptly by hypodermic injections of antipyrine; and S. Fränkel<sup>25</sup> has obtained equally favorable results. Martius<sup>27</sup> believes that neuralgias of all sorts are relieved by the use of antipyrine, and that the lancinating pains and twitchings of tabes are benefited in a really wonderful manner. These tabetic symptoms will sometimes vanish entirely in the course of an hour or even sooner, after the administration of 0.5 grams. If relief is not obtained in 40 minutes the dose should be repeated. Lépine,<sup>26</sup> who formerly advocated the employment of antipyrine in pain, now finds antifebrine preferable, being just as effectual, more easily tolerated by the stomach, and more sedative in its action. Williams<sup>43</sup> has been gratified by his success in treating constantly recurring nervous or sick headaches, some of them of long standing and which had resisted other treatment. He has had under observation about 20 cases to whom antipyrine was given, and in all with good results; the dose used being 16 grains every hour until relieved. No case required more than 3 doses. He calls attention further to the hypnotic action of the medicine, which he says is *uniformly* present, especially in non-febrile patients. The sleep is not deep, but is refreshing. The drug is particularly useful

as a hypnotic in wakefulness after mental strain or activity. Another writer<sup>12</sup> also speaks of antipyrine's hypnotic power in 2 cases of phthisis, where it induced sleep whether the temperature was elevated or not. Gompertz<sup>14</sup> has used it in 7 cases of pure *otalgia nervosa*, with brilliant results in 2 cases, and temporary relief in 2 others. Hamilton<sup>4</sup> found antipyrine in doses of 10–20 grains valuable as a hypnotic in the wakefulness of general disease, and as an anodyne in headaches. It seems to be superior to antifebrine, but possesses some drawbacks. It is valueless in epilepsy, except in some cases of *petit mal*. Robinson<sup>21</sup> has used it in 80 cases of migraine during the last 2 years. In 54 it acted favorably in from 30 minutes to 2 hours; in 15 it produced abatement of the pain, and rendered much smaller doses of the bromides, or chloral, or other drugs effectual than the patients had been in the habit of taking, while in 8 cases no good results were observed. He recommends that doses of 22 grains be taken when the first symptoms of an attack appear, and that this be repeated in 2 hours if no benefit be experienced. Todorsky<sup>42</sup> has employed the drug in 7 cases of various neuralgias. All were severe and of long standing, and had not been benefited by other treatment, and all were cured or improved after 1 or, at longest, 2 days' employment of antipyrine in doses of 15–20 grains.

Seifert<sup>45</sup> gave it in 2 cases of hemicrania, and in neither was the result especially good. One case was benefited three times, but on the fourth occasion the medicine caused so much gastric irritation that it could not be used again; and in a second case the results were also very unpleasant (see later). In 3 cases of supraorbital neuralgia, the drug answered admirably, likewise in some cases of headache in anæmic girls, and in the cardiac pain of a case of aortic insufficiency. Thomson<sup>4</sup> has employed antipyrine in doses of 5 to 15 grains, in some twenty instances of headache of various sorts. He concludes that it is of great value in true migraine, that malarial headache is mitigated by its use, that dyspeptic headache is sometimes relieved, and that the headache of uræmia is unaffected by it. White<sup>4</sup> has never been disappointed in its favorable action in headache after 2 years' experience with it. He was probably the first to make use of it in painful affections, and was led to do this by observing the manner in which it often relieved headache when given as an

antipyretic in typhoid fever. Birdsall<sup>4</sup> considers it the most valuable single remedy for pain in the head, especially in migraine not amenable to other treatment. Chouppe<sup>5</sup> advocates the use of antipyrine in uterine colic. In 1 case which he reports, the pains were excessive following the administration of ergot to combat hæmorrhage, but 2 grams of antipyrine relieved the patient in about 20 minutes. On another occasion, when given  $\frac{1}{4}$  hour after the ergot, it prevented the pain without diminishing the power of the contractions, in this respect showing its superiority to the opiates. Root<sup>16</sup> read a paper on the analgesic effects of antipyrine, in which he stated the belief that it is destined to succeed opium to a great degree, as it fills most of its indications without producing its unpleasant after-effects. He reports several cases, including among others migraine, dysmenorrhœa and abdominal pain from enteritis. Hirsch<sup>20</sup> has adopted Séc's plan of hypodermic injections, with striking results, and reports a series of cases in which pain was relieved at once. A case of tabes was subject to severe painful *crises gastriques* which usually lasted 20–24 hours, but the author succeeded in stopping an attack in 2 minutes by the use of the drug in this way. Another patient who had suffered for 8 days with violent, frequent and long-continued asthmatic attacks, was relieved in 2 minutes after the injection; and 3 days later there had been no return of the paroxysm. S. Fränkel,<sup>25</sup> too, praises the hypodermic use of antipyrine in pain, and found it efficient where its internal employment had been of no avail. In no case did the remedy fail.

The usual dose employed was 0.25 grams dissolved in an equal quantity of water. The effect of the injection appears to be local, extending over an area 6–7 ctm. in diameter; therefore the larger the painful area, the greater number of injections must be employed. The action began in 10–15 seconds at latest, and lasted at least 6–8 hours, the pain usually not returning at all in the same position. He believed that this method is destined to limit largely the use of morphia, and to be of great benefit to many patients.

A very interesting communication is that of Sonnenberger<sup>25</sup> on the treatment of whooping-cough. This author has treated about 70 cases with antipyrine alone, and has found it to reduce very greatly the number and severity of the paroxysms. This was especially true when given early in the course of the disease,

before the time had come when the decline of the symptoms was about to begin and when almost any medicine would apparently do good. A number of control experiments were made, all showing that it was in reality the antipyrine which was of benefit. He had already tried the usually accepted plans of treatment in whooping cough, and found that antipyrine by far surpasses any others of which he has knowledge.

*Injurious or unusual effects* from the employment of antipyrine have been often reported, and among those which we have read during the past year, we may note the following: Ripley<sup>46</sup> used antipyrine at the outset of the disease in a number of a series of 60 cases of measles occurring in an asylum, and it was apparent that these patients did not do so well as those who had been treated by ordinary methods. G. D. Hays<sup>4</sup> calls attention to the dangers of the drug when given in too frequently repeated doses. Very serious collapse occurred in 3 cases which he reports. Brooks<sup>47</sup> records 2 cases of collapse in typhoid fever in children of 9 and 18 years of age respectively. Ten grains had been given to each, and the dose repeated in an hour in the second case. Under stimulation both recovered. Another writer<sup>36</sup> reports a case of typhoid fever with severe collapse, vomiting and cyanosis, after 15 grains of antipyrine in divided doses. Seifert<sup>45</sup> administered 1 gram for hemicrania, but the medicine produced headache, dizziness and pain in all the limbs to such a degree that the effects were far more unpleasant than the migraine itself. Porter<sup>4</sup> reports a fatal case of rheumatism, with extensive fatty degeneration of the kidneys and liver, probably caused by the continued use of antipyrine; and states that he has frequently noticed this fatty change in the bodies of those who have been treated by the drug. Guttman<sup>15</sup> found cyanosis, increased frequency of the pulse, dyspnoea and a sensation of extreme heat over the whole body, follow the dose of 15 grains in one case. In another case similar symptoms appeared after the same amount, together with œdema of the legs which continued for three days. In rare instances the temperature may rise for a time after the administration of antipyrine, instead of falling. This occurred in a case of Wetterdal,<sup>35</sup> and in one of Laache,<sup>35</sup> and in the latter's patient there was with the increase of temperature an eruption of the skin, and a burning in the mouth and eyes and along the œsophagus. The well-known liability of



the drug to produce a cutaneous eruption is still further shown in 2 cases of Dally,<sup>13</sup> in which the rash very strikingly resembled that of measles; and Paget<sup>13</sup> reports a case where it persisted for 5 days, the administration of the medicine being meanwhile continued. Sée<sup>40</sup> also refers to the early urticarial eruption following the prolonged use of antipyrine as constituting its most serious inconvenience.

Regarding the indications for and the care to be used in the employment of antipyrine to reduce fever, we may refer to the opinion we expressed in discussing antifebrine. As an anodyne and nervine we have frequently found it useful, and have also been as frequently disappointed in it. The pains of chronic rheumatism have sometimes yielded to it; sciatica has in some instances been decidedly benefited and we have seen it sometimes act in a remarkable manner in cases of headache, and again as signally fail. It has at times produced quiet sleep in cases of the morphia habit. No permanent benefit has been observed in the treatment of epilepsy by it. Sonnenberger's results in pertussis we have confirmed in a number of cases, and it would seem that the drug may be destined to occupy a prominent place in the treatment of this disease.

*Antithermine (Phenylhydrazinleculinic Acid).* — Antithermine, as its name denotes, is an antipyretic. Its discovery and methods of preparation were announced by Nicot,<sup>48</sup> but nothing further was then published as to its dose and employment, nor has any thing later appeared of importance.

*Apomorphia.*—A few notes on its expectorant action have appeared. Fliesburg<sup>21</sup> has used it for the last 3 years in capillary bronchitis and membranous croup, in probably 150 cases. The dose employed was .001–.002 grams every 1 or 2 hours, according to the urgency of the case. He has always found it produce a watery exudation in the bronchi, and loosen the thick tenacious and suffocating phlegm. He considers it an invaluable and too much neglected remedy, but insists that the dose advocated by Wood ( $\frac{1}{15}$ – $\frac{1}{7}$  grain every 2 hours and double this dose for an adult) is very dangerous and may produce collapse. Even the emetic dose is but  $\frac{1}{6}$ – $\frac{1}{4}$  grain.

Stocquart,<sup>35</sup> of Brussels, also values it highly. When used for distressing hacking cough with scanty or no expectoration,

amelioration is observed in a few days. He, too, gives but a minute dose; only .003 to .004 grams in 24 hours, dissolved in water, to which a little hydrochloric acid has been added to preserve it. It is usually well borne; but a few individuals exhibit a peculiar susceptibility to it, and colic, nausea, diarrhœa may result.

*Arsenic*.—A writer<sup>21</sup> calls attention to the value of the drug in sore throat. Given in doses of 1 to 2 drops of Fowler's solution for 4 or 5 months, it will often remove the disposition to pharyngitis. Rendu<sup>41</sup> recalls his experience with the drug in phthisis 10 years ago, when he studied its action critically as compared with cod-liver oil, and found it to be greatly inferior to it. Of 30 cases of phthisis, 10 were treated during 100 days by expectant or simple tonic means; 10 were given cod-liver oil, and 10 were placed on arsenic. The first group lost weight; the third likewise, while the second gained 2.15 kilograms for every 100 kilograms of the patients' combined weight.

*Belladonna*.—An editorial writer<sup>21</sup> relates the incident of a child of 4 years, with a violent sore throat and enlargement of the cervical glands, where by mistake 20 instead of 2 drops of the tincture were given every 2 hours, until 80 drops had been administered. Distinct though not alarming symptoms of poisoning appeared, but by the next day the child was well and the glandular swelling had vanished. Though not of course approving such large doses, he desires to impress the fact that in some cases it is only a large dose which will meet the requirements of the case.

*Benzanilide*.—This substance is nearly related to acetanilide (antifebrine), the acetic acid of the latter being replaced by benzoic acid. In the course of their studies on antifebrine Cahn and Hepp<sup>20</sup> used benzanilide in 12 cases of different febrile affections, 7 being patients with typhoid fever. Its action is very similar to that of acetanilide, in that it produces sweating; but after its use the temperature rises more slowly than after the latter drug. Its dose is twice as great.

*Bismuth Subnitrate*.—Henry,<sup>49</sup> of Illinois, relates some cases illustrating the value of this agent in the relief of gastric pain. In one instance of gastrodynia, where other measures had failed, a large dose of bismuth gave immediate relief, and in another of acute gastritis, the remedy was equally efficacious.

*Boracic Acids, Borates.*—Borax and boracic acid formed the subject of a communication by Bedoin<sup>50</sup> who upholds the use of them externally as an antiseptic dressing. They are also useful in the preservation of articles of food. Internally he recommends boracic acid instead of carbolic acid in the antiseptic treatment of disease, and claims that his results have been very encouraging. Borate of magnesia has been recommended by Opperman<sup>3</sup> as a disinfectant and antiseptic. He deems it superior to boracic acid on the ground that it is quite soluble in hot water, and will not be precipitated on cooling. Borate of ammonium has been used in phthisis by Lashkevich<sup>35</sup> with great success in doses of 5 grains t. d., and sometimes by the spray. It diminishes the expectoration, and in some instances the fever if the disease is in the early stages. Searcy<sup>8</sup> praises boric acid very highly, as serving a much better purpose than iodoform, and being free from odor, the production of smarting or of constitutional symptoms. He uses it in the form of the powder applied freely. Cancer of the uterus is well treated by it. In solution it constitutes a valuable injection in diseases of the urethra or vagina in the strength of 10 grains to the fluidounce for the former, and  $\frac{1}{2}$  ounce to the pint for the latter. He considers it almost a specific for ring-worm, if the powder be rubbed into the moistened skin twice a day. It is also valuable in eczema, and its uses in bromidrosis are widely recognized. Wulfsberg<sup>13</sup> has used a borax ointment made with lanoline in cases of eczema and other cutaneous diseases. [For the report of a case see "*Lanoline.*"]

*Bromides and Hydrobromic Acid.*—Anders<sup>8</sup> contrasts the respective value of hydrobromic acid and its salts. He deems the latter superior for the prevention of the tinnitus aurium and headache following the use of quinine, and in the treatment of epilepsy. In some other diseases the acid and its salts are about equally serviceable. Such are whooping-cough, neuralgia, troublesome cough from laryngeal or bronchial irritation, and cerebral hyperæmia. When given alone the acid was inferior to the bromides in the treatment of functional irregularity of the heart; but when combined with quinine, as Fothergill suggests, it yielded admirable results. In a series of other cases of organic heart disease associated with irregular cardiac contractions it has done excellent service combined with digitalis, arsenic and

iron. Frequently the acid appears to be superior to the salts; as for example in gastric irritability, congestion of the pelvic viscera, and particularly in neurosthenia and post-hemiplegic chorea. In some of the cases the bromides did not have a good effect when the acid did. In others, though the salts relieved the symptoms, yet this relief was accompanied by a progressive loss of muscular power of a slight or serious nature. On trying now hydrobromic acid, the author found that he could obtain all the good effects without any depression of strength. He therefore advises that in all diseases in which the action of the acid and its salts are equally good, the former be employed in order to avoid the well-known depression following the use of the bromides.

[For *Bromide of Lithium*, see "*Lithium*."] ]

*Calendula*.—The value of calendula as a dressing for wounds is illustrated by three cases reported by R. G. Reynolds,<sup>18</sup> who uses a tincture made by adding 3 parts of alcohol to 1 of the fluid extract. The wounds remained aseptic until the termination of the healing process. These cases were all instances of serious injuries, yet healed rapidly and without suppuration, the part being kept constantly wet with the solution. The drug relieves pain, stops bleeding and promotes repair.

*Cannabis Indica*.—The use of the tincture of cannabis indica in diarrhœa is advocated by Bond and Edwards.<sup>4</sup> They have found it valuable in nearly all forms of the disease, but especially so in summer diarrhœa. They usually give it in combination with chloroform, morphia and aromatic spirits of ammonia; and cause the patient to abstain from food for several hours. It always seems to us a question how far the opium is the valuable agent in these combinations; and we cannot but think that the drug should be used by itself in order to test its actual effect. Mackenzie<sup>13</sup> contributes a valuable paper on the treatment of headache by cannabis indica. He has used it with great success for the constant headache lasting day after day, and not depending on anæmia or any peripheral irritation. The dose is  $\frac{1}{3}$  of a grain or more of the extract night and morning, to be increased to 1 or 2 grains at night, and to 1 or  $1\frac{1}{2}$  grains in the morning. He has seldom found it necessary to exceed this dose, and his results have been excellent. The editors may here call attention to the fact that migraine may sometimes be aborted by a full dose of cannabis

indica, though slight temporary delirium may be induced by an amount sufficient to relieve the pain in the head.

*Caffeine (Coffee).*—Considering first the seed itself, we may notice that Heim<sup>27</sup> claims that freshly ground coffee is an antiseptic, and may be used to cover wounds when other means are not at hand. Caffeine has no such quality. Hughes<sup>8</sup> has administered coffee as a stimulant and nerve tonic for the last 20 years, and found that in epidemic febrile disorders in army practice, those cases did better to whom strong coffee was freely administered. It is not only a heart tonic, but a powerful nerve tonic, and sustains and heightens the power of resistance of the organism under disease.

*Calcium (Lime).*—Duckworth<sup>8</sup> recommends for erysipelas an ointment composed of equal parts of prepared chalk and lard, to each ounce of which 30 grains of carbolic acid have been added. Precipitated carbonate of lime may be used instead of the chalk. Another preparation of lime, the chloride, is considered by Spillmann<sup>57</sup> to be a valuable therapeutic agent in a number of diseases. In rachitis it has long been used with success. Its solvent power on albuminoid material renders it valuable in tumors, arthritis and chronic rheumatism. Here it may be used externally, in the strength of 80 parts to 1000 parts of water. Internally, the dose should be 0.5 gram for children, and 1.5 for adults dissolved in syrup. This favorable opinion of the drug is based upon its trial in 18 cases.

*Carbolic Acid.*—Testimony corroborative of the value of carbolic acid as an antipyretic is given by Kirk,<sup>35</sup> In one case of fever with rigors after parturition he applied it to the fundus, and left cotton pledgets saturated with it in apposition with the cervix. The temperature was promptly reduced, but with symptoms of collapse, and it was clear that the acid had been absorbed, and had exerted a decided antipyretic action. In a case of typhoid fever in a boy of 14 years, he administered carbolic acid in doses of 4 grains every 4 hours with some reduction of temperature, and with very marked carboloria.

We cannot but feel that the use of this drug to reduce febrile temperature is not advisable in the presence of so many other more powerful and less dangerous antipyretics.

Another writer<sup>35</sup> brings to notice the use of weak solutions of

carbolic acid sponged on the body, and even on the clothing to keep insects away in summer time. Add some of the saturated solution (6-7 per cent.) to water until the latter smells strongly. This may be applied with perfect safety with a sponge. The editors have no doubt that horses and cattle might be protected from flies in the same way. Jamieson<sup>13</sup> highly recommends the use of carbolized oil as an inunction in scarlet fever, and claims that in this way, and by antiseptic applications to the throat, he is enabled to entirely avoid the danger of contagion to children lying even in adjacent beds.

*Chloral*.—C. H. Hughes<sup>52</sup> condemns the hypodermic administration of the drug as liable to be followed by fatal results; though it is undoubtedly a powerful general anæsthetic when used in this way. By the mouth it is specially valuable during labor; and larger doses can be administered with impunity then than at any other time. As an hypnotic, he prefers it to other more modern agents; and makes great use of it as a calmative and antispasmodic, in all spasmodic and convulsive affections.

Another writer<sup>53</sup> states that chloral may be taken for long periods in albuminuria without fear of cumulative action; and may, indeed, as has been claimed before, even remove the albumin from the urine. This author also extols chloral as the best remedy in whooping-cough. In chorea he has had excellent results with it in doses of 1.0-1.5 grams daily to children of 5 years or less; or in such doses that the patients may be awake part of the day.

*Chloroform*.—The value of chloroform in cerebro-spinal meningitis is referred to by Stroud,<sup>54</sup> who administered it by inhalation in a case of this disease. In this way the recurrence of the very severe convulsions was prevented; the patient being brought, meanwhile, under the influence of other medication.

*Cinchona and its Preparations*.—Ripley<sup>46</sup> has again tested the antipyretic action of quinine, which becomes of renewed interest in connection with the newer antipyretics. The drug was given in 20 grain doses once in 24 hours to 48 patients with pneumonia, if the rectal temperature reached 103° F. In one half of the cases the temperature was lowered 1-2° F., and in the remainder less than 0.5° F. He concludes that quinine is a feeble and uncertain antipyretic, and that it has a bad effect on appetite and digestion,

and is liable to provoke cardiac weakness; and he much prefers antipyrine or salicylate of soda if an antipyretic action be desired. Mary P. Jacobi's<sup>46</sup> results in 100 cases of pneumonia in children led her to believe that quinine is not to be relied upon as an antipyretic. Holt, Fruitnight and Cassel<sup>46</sup> also expressed their unsatisfactory experience with the action of quinine in this respect, and Broadnax<sup>49</sup> considers the drug absolutely injurious in pneumonia. A. Jacobi<sup>46</sup> still uses it for its antipyretic action, and especially advises its employment hypodermically, recommending for this purpose the carbomide on account of its greater solubility. The employment of quinine hypodermically is also advocated by Talley,<sup>8</sup> who employs the bimuriate of quinia and urea (quinia bimuriatica carbomidata) which is soluble in an equal part of water, and which he prefers to all other salts. By injecting slowly into the muscles as the needle is being withdrawn he avoids all danger of abscess. Bareggi<sup>55</sup> has used the bichloride of quinine hypodermically in a solution of a strength of 1-5, and has made 653 injections in 18 individuals, selecting the gluteal region, and inserting the disinfected needle deeply into the tissues. Abscess has occurred in but one case, where the lumbar region was chosen instead of the gluteal. Only such cases were treated by this method as were unable to take the drug by the mouth. 2-10 injections were given daily, each containing 15 grains of the salt. Delfin<sup>8</sup> has treated 6 cases of acute tetanus with the valerianate of quinine on the ground that the disease was of paludal origin. 4 cases recovered. Sée<sup>36</sup> instituted a comparison between the antithermic action of cold bathing and of quinine, and evidently considers the latter to be much superior, on the ground that it is a tonic to the heart and that it also decreases oxidation of the tissues. Hagens<sup>56</sup> has tried the borate of quinoidine (*chininum amorphum boricum*) in 33 cases of different diseases, with unsatisfactory results; the substance seeming very liable to produce disturbance of the digestive tract.

*Coca, Cocaine.*—After all that has been written on the subject during the last few years, not much new can be expected in the 12 months just past. It has been asserted that the value of coca wine or extracts does not depend on the alkaloid alone. Nachtigall,<sup>12</sup> for instance, insists that coca wine and “coca tobac,” must be made from the leaves and not from a cocaine solution. This is

a question outside of our province to determine, and we shall discuss the drug and its alkaloid together.

In diseases of the digestive tract, Eller<sup>57</sup> recommends for toothache, absorbent cotton saturated with a solution of cocaine and morphia and allowed to dry. A pledget of this is to be introduced into the diseased tooth. Dailly<sup>50</sup> also praises the action of cocaine hypodermically before the extraction of teeth, though severe constitutional symptoms may be produced in this way. Dujardin-Beaumetz<sup>53</sup> recommends cocaine to facilitate lavage of the stomach. In gastric pain and vomiting it is also useful in tablespoonful doses of a solution of 1 part in 600, given every quarter of an hour until the patient is relieved. Frey<sup>55</sup> has used  $\frac{3}{4}$  grain dissolved in water in a case of constant vomiting where other means had failed. Immediate relief followed for 2 hours; another dose stopped the vomiting for 6 hours, and after the third dose it entirely ceased. In gastric and intestinal catarrh, as a palliative in carcinoma ventriculi, and to dispel or prevent the sense of hunger, coca wine is highly recommended by Nachtigall.<sup>12</sup> Perhaps the most important communication is that of Diederich's,<sup>58</sup> who has employed the tincture (1 part of the leaves to 5 of alcohol) in 45 cases of diarrhœa in children, in doses 4–6 drops at 3 months of age, and up to 15–20 drops in older children every 2 hours. In all but 2 cases, the diarrhœa was promptly checked at latest after 48–70 hours.

For the diseases of the respiratory apparatus, cocaine has been previously recommended in pertussis, and its use here is again upheld by our Corresponding Editor, Dr. Gougenheim,<sup>53</sup> who paints the walls of the nasal fossa with it in solution; and by Diederichs,<sup>58</sup> who used the tincture of the leaves (1 part to 5) internally, and sometimes a cocaine solution locally to the pharynx with most satisfactory results. The last-mentioned writer has also given coca in bronchitis and in spasm of the glottis. Nachtigall<sup>12</sup> employs cigarettes made of coca leaves in the treatment of asthma, and considers them preferable to those made of hyoscyamus or stramonium.

As a cardiac tonic the preparations of coca have frequently been recommended, and Leyden has already declared the wine of coca to be a very useful agent in cardiac overstrain. Beverly Robinson<sup>4</sup> has used it (Mariani's) on several occasions where



digitalis proved useless or injurious, and considers it one of the best means to restore the heart muscle to its normal tone.

Under genito-urinary diseases, Dujardin-Beaumetz<sup>50</sup> relates a case of incontinence of urine in a young man of 17, cured by injections into the bladder of 0.5 grams of cocaine in 100 ccm. of water. Very little absorption takes place from the vesical mucous membrane, but it is necessary to assure ourselves that no dissolution in the continuity of the lining of the bladder is present, otherwise dangerous symptoms might follow.

For the treatment of burns, Eller<sup>57</sup> has recommended to employ absorbent cotton saturated with cocaine and boric acid in glycerine. Wende<sup>13</sup> uses it with lanoline as an ointment in burns and in itching cutaneous diseases. Finally, as a nervine, the coca tincture, and especially the coca cigarettes are recommended by Nachtigall<sup>12</sup> in migraine; and Diederichs<sup>58</sup> reports a few favorable results from the use of the tincture or extract of coca in epilepsy or chorea. The number is, however, too small to base any conclusions upon it.

*Cod-liver Oil—Morrhual.*—Léger says that cod-liver oil may be conveniently given in an emulsion made with milk-casein, which takes the place of gum arabic and is superior to it. He describes the method of preparation. Hare<sup>16</sup> finds that the amount of exposure and the degree of friction required in innunction with cod-liver oil may be greatly lessened by the use of the bile salts. If a pinch of these salts—whose method of preparation he details—be added while rubbing in the oil, the latter will disappear in nearly half the time ordinarily required, and the odor and greasiness remaining is far less than usual. The rubbing produces no irritation of the cuticle, even when repeated on the same spot several times in the 24 hours. Langlebert<sup>36</sup> has made an analysis of the salt in which the cod are packed, and finds that it contains methylamine in considerable quantities, and recommends that it be employed for bathing in anæmia, chlorosis, rickets and other affections.

Regarding the action of morrhual, supposed to be the active principle of cod-liver oil separated from the fat, a writer<sup>59</sup> reports 2 interesting cases: The first, a child with purulent pleurisy, had never been able to tolerate cod-liver oil, but improved steadily on taking 3 capsules of morrhual daily. The second case also, one of

chronic bronchitis with scoliosis, could not take oil, but recovered rapidly under the use of 4 capsules of morrhuol per day.

Lafage<sup>2</sup> details a method of obtaining morrhuol and recommends its use wherever the oil itself is not well borne. It never disturbs digestion, and indeed increases the appetite. Its effects were surprising, even in patients in the first stage of tuberculosis with severe cough and emaciation. In the course of 3-4 days the appetite and general condition improved. The cough became markedly relieved, and the expectoration diminished. The rapid action on the bronchial secretions of phthisis led to its employment in cases of chronic bronchitis, which had not been greatly benefited by other plans of treatment. The results in most of these were very satisfactory. Rachitic, anæmic and scrofulous children have been treated with morrhuol instead of oleum morrhua, and were as a rule favorably and rapidly affected by it.

*Collinsonia Canadensis*.—J. V. Shoemaker<sup>19</sup> calls attention to this plant, already used as a domestic remedy. He claims that incontinence of urine in children may be entirely relieved by drachm doses of the tincture after supper and at bed-time. Chronic gonorrhœa may sometimes be cured by it after cubebæ and sandal wood have failed. In three cases of vague pelvic and abdominal symptoms supposed to be due to spasm of the sphincter ani, he was completely successful with suppositories containing 40 to 90 grains of the powdered root. The drug also proved serviceable in two cases of gastralgia, where morphia, belladonna and other remedies had afforded but temporary relief. In several cases of dysmenorrhœa it was also of benefit.

*Condurango*.—The use of condurango bark in carcinoma of the stomach is being revived, and Riess<sup>20</sup> publishes a series of clinical experiments illustrating its good effects. One patient gained 12 kilograms in 83 days and another 15 kilograms in 36 days. Pain and vomiting were almost always relieved, and the appetite improved.

While believing that condurango is an excellent stomachic, the editors have failed to observe any specific action in those cases of carcinoma ventriculi under their observation in which it has been employed. The drug is, however, worthy of further trial.

*Conium*.—Madigan<sup>60</sup> states that conium has both a peripheral sensory and a central motor action. As a peripheral drug, he has

found it valuable when used in the form of an ointment with wool fat or with lard, and applied by inunction in cases of neuralgia. In the neuralgic pain accompanying pregnancy, he has applied it in this way to the perineum. The pain of uterine cancer, and the vesical irritability of cystitis have been relieved in the same manner. Pruritus ani, even when fistulae are present, is often removed by it. But it is as a motor sedative that he has found it especially valuable. In the typhoid condition resulting from mental overwork, and which is attended by insomnia, exaggerated nervousness and agitated delirium, conium often acts like a charm in procuring slumber by removing motor agitation. It should be given in 10 minim doses of the fluid extract of the unripe fruit, repeated every  $\frac{1}{2}$  hour till sleep comes on; but its action must be well watched. It is most important to have a good preparation. Madigan also recommends it for epilepsy, acute mania, hysteria and in most convulsive disorders. In all of these it has no direct hypnotic action, but simply removes the motor excitement. It may, therefore, be advantageously combined with other hypnotic drugs. He states that an admirable combination is that of 7 minims each of the fluid extract of conium, and the fluid extract of hyoscyamus, with 10 grains of chloral in water, taken at a single dose.

*Convallaria*.—The dispute over the nature and action of the active principles of convallaria has been so great, owing probably to the difference in the chemical nature and purity of the specimens examined, that Nathanson<sup>61</sup> has subjected them to a therapeutic test. He administered the glucosides, convallarin and convallamarin to several cases of heart disease, and found that while the first had no favorable effect upon the heart, convallamarin, on the other hand, proved itself a valuable cardiac stimulant, capable of restoring disturbed compensation, and free from any unpleasant after-effects. It was administered in doses of 0.03 to 0.3 grams for from 11 to 17 days. In one patient where digitalis, adonis, squills and caffeine had failed, convallamarin also had but slight effect; but in 3 other cases, a rapid and striking improvement followed, with only slight nausea, some giddiness and salivation, and these only occasionally. No cumulative action was at any time observed. It is absolutely necessary to obtain a pure preparation.

*Corn Silk*.—A. Crull<sup>21</sup> has been testing the value of this remedy. He considers it an unirritating and very reliable diuretic,

valuable in organic heart disease, in acute and chronic renal diseases, irritable bladder, gonorrhœa, and retention or suppression of urine from any cause, either in adults or infants. The dose which he employs is 1–2 drachms of the fluid extract in water every 2–3 hours until relief is obtained. If used continuously the dose must be after a time increased. It is a curious fact that this so excellent remedy in irritable bladder may, in healthy persons and in overdose, cause irritability of the bladder, palpitation and restlessness.

*Creolin*.—This substance, concerning which Esmarch<sup>62</sup> publishes the results of his investigations, is a dark-brown syrupy fluid smelling of tar, and forming a milky emulsion with water. It is obtained as a distillation product from coal. The author has determined that it is decidedly more active than carbolic acid in its effect on pure cultures of pathogenic microbes which have not produced spores; but that in putrefactive masses the acid is more powerful and has a more persistent action. It would seem that creolin undergoes a chemical change when in contact for some time with putrid fluids, and that it then loses its disinfecting power. Esmarch considers this agent especially valuable as a deodorizer. The most offensive fluids when shaken with 1 per cent. of creolin will lose their unpleasant odor, while with an equal quantity of carbolic acid no effect is obtained. This deodorizing action of creolin disappears largely after an interval of 8–10 days. The drug is not poisonous, and in this respect, too, has a great advantage over some other disinfectants; but as offered for sale it is unfortunately of varying strength. The author recommends its trial in the treatment of wounds.

*Digitalis*.—Very little has come to our notice concerning this medicine. Rosenbach<sup>20</sup> recommends its administration with ergot in asthma, aortic insufficiency, and idiopathic cardiac dilatation with alteration in the elasticity and contractility of the blood-vessels; and reports favorable results from their combined use. Kobert<sup>21</sup> discusses the action of the active principles of digitalis as compared with the other active stimulants, claiming that while digitaline has the power of contracting all the vessels of the body, digitoxine and digitaline dilate the vessels of the kidney. Hence it is only in digitalis that we have a drug which increases the force of the heart and contracts the vessels of the periphery except those of the kidney. It therefore constitutes an ideal diuretic, since it

increases at the same time both the rapidity and the volume of the renal circulation.

He does not admit that strophanthus has the same peculiarity, as Fraser claims; and he considers that digitalis cannot be supplanted by any of the newer cardiac stimulants; they having only the advantage that they do not cause vomiting and purging, as digitalis does in certain cases. An alcoholic preparation should be employed, since digitoxine is insoluble in water.

*Dioscorine—Wild Yam (Cale).*—Todd<sup>10</sup> says that this native drug, to which but a few words are allotted in the National Dispensatory, under the name of "colic root," has proved invaluable to him in the treatment of hepatic colic. A patient who had tried every means for the relief of this affection, was advised by some one to use the fluid extract of wild yam, and from the beginning of his use of it, never had another attack. Five years ago, the former invalid imparted the information to him, and he has made extensive use of the remedy ever since, with all the success that could be desired, and in too many instances to attribute the result to mere coincidence. The drug aids the anodyne action of opium during the attacks of biliary colic, and prevents their return if the remedy is continued.

*Diorynaphthaline.*—Lépine,<sup>5</sup> after discussing the chemical position and composition of this body, and its action upon animals, recommends it for therapeutic use. He gave it in doses of 0.25 grams 4 times a day to asthenic individuals, whose force was manifestly increased thereby. It is certainly a medicament to be used with caution.

*Euphorbia Drumondii.*—Drumine, the alkaloid of *Euphorbia drumondii*, is recommended by Reid<sup>13</sup> as a new local anæsthetic. He has used it in nasal catarrh, burns, pruritus, dermatitis and spasmodic contraction of the anus; also hypodermically in sprains and periosteal pain. One case of sciatica was permanently cured by two injections. It was also useful as an anæsthetic in some small operations. Applied to the eye, it renders the conjunctiva insensible, and does not cause any primary stimulation of sensation as cocaine does, nor dilate the pupil; nor does it produce constitutional symptoms when applied to a raw surface. He concludes that the drug is a pure anæsthetic, that it is safe, and may be used both internally and externally with advantage. Ogston<sup>53</sup> repeated

Reid's experiments with the drug, but without discovering any anæsthetic property in the samples sent him, and believes that they may have undergone some chemical change during the voyage. The subject clearly needs to be still further investigated.

*Ergot.*—Bumm<sup>63</sup> insists that the proper place for hypodermic injections of ergot is the nates and not the skin of the abdomen, as recommended by others. A 5–10 per cent. aqueous solution of the extract, almost neutralized by soda, should be used, and the injection should be an intra-muscular one. In this way almost no after-effects will be observed. The greater part of the pain sometimes occurring is due to the acid reaction of the extract used; yet to entirely neutralize it destroys much of its value. Led by the likeness between the action of quinine and ergot, Savitski<sup>8</sup> has used ergotine very largely in intermittent fever, and with excellent results, especially when the patient had spleen. In chronic cases he gave about 3 grains a day. When combined with quinine but one-half the usual dose of the latter need be employed,—thus effecting a very great saving in an expensive drug.

As regards diseases of the alimentary tract, we find Todd<sup>10</sup> recommending the use of the fluid extract in internal hæmorrhoids, a proceeding which he states is not original with him. Of 8 bad cases he has effected a cure in 6, by the injection twice a day of 1 drachm of the fluid extract with an equal quantity of hot water, not into the tissues, but simply into the cavity of the rectum. If the bowel does not tolerate it well, 10 drops of laudanum may be added. Ergot has been recommended by Kelly<sup>18</sup> for pulmonary inflammation, though he admits that its use for this purpose is not new.

For violent and persistent cough in bronchitis and phthisis, ergotine, in doses of 10–20 grains administered at night, is recommended by Allan,<sup>13</sup> though when the condition is acutely febrile, it has less effect.

Under the diseases of the nervous system, we find ergot highly praised by Kelly<sup>18</sup> in cerebral injury. He has used it for years in such cases. Its utility is obvious as a means of diminishing the reactionary circulation in concussion and of limiting extravasation in laceration. Emerson,<sup>9</sup> too, says he knows by abundant experience that ergot relieves passive congestion of the brain.

*Erigeron, Oil of.*—Bartholow's<sup>64</sup> recent experience with this

substance satisfies him that its former reputation as a hæmostatic is well deserved. A case of metrorrhagia which had proved obstinate to other remedies, yielded admirably to it, and further experience satisfied him that in oil of erigeron we have a valuable remedy for certain cases of menorrhagia and metrorrhagia and probably for passive hæmorrhage in general. In some cases of neurasthenia where menorrhagia often becomes an embarrassing complication, he has found erigeron to act very efficiently, moderating the flow to proper dimensions, improving the general condition, and lessening the nervous irritability. He then had recourse to the drug in albuminuria, and found that it checked it in a remarkable way. In the chronic forms of Bright's disease, of whatever pathological nature, erigeron oil lessens the amount of albumin, lowers the abnormal vascular tension, and improves the general condition. It also seemed to have a very favorable action on the headache, nausea and other symptoms of a uræmic character. Whether it can be actually curative in cases not too far advanced, may only be determined by further trial. Cystitis is also favorably influenced by the oil, which lessens the irritability and decreases the catarrh. In catarrh of the bronchial tubes, in chronic bronchitis and nervous cough, considerable relief is often afforded. The author considers it fully as valuable here as terebene, whose good effects have been with justice so highly praised.

The dose of the oil of erigeron is 5 drops on a lump of sugar every 3 or 4 hours.

In this connection the editors may quote the personal communication of Dr. De Forest Willard, who makes constant use of the oil of erigeron in epistaxis, and who says that since his employment of this remedy, he has rarely if ever found it necessary to plug the nares, even when called in consultation for this purpose.

*Ethoxycaffeine.*—Chabot<sup>65</sup> relieved the pain of herpes zoster in an anæmic patient by 1 gram of the drug given in 5 doses; and  $\frac{1}{2}$  gram in 5 doses cured an obstinate case of migraine. He also reports two other cases of migraine cured completely by it. Dujardin-Beaumetz<sup>65</sup> gives it with salicylate of soda to facilitate solution, and with cocaine to prevent the gastric pain which it so often causes.

*Ethyl Lactate.*—Pellacani and Berton<sup>36</sup> find by experiments on animals that this substance is, in small dose, a hypnotic, and

in large dose, a complete anæsthetic with affection of the respiration, followed by death. On man, 8 grams of the lactate of ethyl have produced sedative action without appreciable evidences of respiratory involvement.

*Eucalyptus*.—A French naturalist, Guilmet, some years ago, discovered in Tasmania, a peculiar honey stored by a small black bee, the *apis nigra mellifica*, in huge dome-shaped nests in some enormous eucalyptus trees. After obtaining the honey, he found it to contain the active principles of eucalyptus. Thomas-Caraman,<sup>66</sup> has been experimenting with this both upon animals and man, and believes that we have in it a valuable remedy in the treatment of diseases of the throat and lungs, as a cardiac sedative, in genito-urinary diseases, whooping-cough, malaria and typhoid fever. The effort has been made to domesticate the bee, but without success; and the ordinary bee fed upon the flowers of the eucalyptus soon dies.

The most important employment of eucalyptus during the year is the hypodermic injection first introduced by Meunier.<sup>11</sup> He employs a solution in vaseline, in a proportion of 5 to 20, and claims that its injection under the skin does not cause pain or other inconvenience, and also that it is the most available method of practicing antiseptic medication.

Biot<sup>67</sup> has treated 8 tubercular patients by this method and recommends it as harmless to the tissues in a proper dose, *i.e.*, not over .25 grams eucalyptol, with .0125 of iodoform per day, given at one injection; this being sufficient to keep the blood saturated with it, as evidenced by the constant odor upon the breath. Excellent results were obtained in a case of tuberculosis of the knee, where the injections were made into the joint itself. In phthisis this method is, he thinks, probably the most valuable one we have, and he reports in detail several cases illustrating its good effects. This plan of treatment is, of course, based upon the supposed germicidal powers of eucalyptus. A dissenting voice is raised by Dujardin-Beaumetz,<sup>11</sup> who, though he admits that the injections are not attended by any unpleasant symptoms, states that they are also not productive of any appreciable improvement in the patients, who complain of the disagreeable odor of the breath.

Then, too, Mollière<sup>41</sup> claims that the injection does sometimes



cause pain; and Chabannes<sup>42</sup> reports some experiments made upon tuberculous sputum with a solution of eucalyptol, in which it was shown that this drug is entirely without power as a microbicide. It would seem, then, that the value of eucalyptus used in this way is at least questionable, and demands further investigation.

*Eugenol*.—This, the active principle of oil of cloves, has been studied by Oehse,<sup>68</sup> who has given its composition and properties. He describes it as an antiseptic superior to phenol, and as a febrifuge inferior to salicylic acid, quinine, thalline or antipyrine. Its dose is 3 grams dissolved in alcohol and diluted with water.

*Euphorbia Drumondii*.—(See *Drumine*.)

*Euphorbia Heterodoxa*.—(See *Alreloz*.)

*Euphorbia Pilulifera*.—Payne<sup>21</sup> has used this remedy in 3 cases of spasmodic asthma, and has been greatly pleased with the results. The cases were exceedingly chronic, one of them having had attacks of asthma with great dyspnoea and weakness for 20 years, and the other for 27 years, *i.e.*, ever since childhood. Under the influence of *euphorbia pilulifera*, in doses of 30 to 60 drops of the fluid extract, *pro re nata*, great relief was obtained or the attacks prevented.

*Ferrum*—*Iron*.—For some years Losio<sup>69</sup> had been experimenting with iron in order to discover the quickest way to bring deteriorated blood back to its normal condition, and believes that this can best be accomplished by hypodermic injections. For this purpose he has used the pyrophosphate, albuminate, citrate, tartrate, lactate, ammonio-citrate and sulphate in aqueous solution in the strength of  $\frac{1}{2}$  to  $1\frac{1}{2}$  per cent. It is absolutely necessary that the salt be chemically pure. He has employed this treatment in a large number of cases, and with some very favorable results, and concludes that the therapeutic action of iron is much greater in this way than in any other, that the ammonio-citrate is probably the best, but that the albuminate and lactate cause the least burning pain and do not give rise to abscesses. He reports several cases in full. An article appears by Creswell<sup>5</sup> in praise of the peptonate which he considers the physiological iron salt *par excellence*, inasmuch as the metal, in order to be absorbed, must enter in some way into combination with the food.

*Fluorides*.—Lucas<sup>70</sup> recommends the fluoride for the treatment of hypertrophy of the spleen, using a solution of the fluoride

of ammonia of the strength of 4 grains to the ounce. Beginning with 5 minims in water after meals, the dose is increased up to 18 or 20 or more. It may produce nausea and purging, if given in overdose. The author considers that it excels any other plan of treatment of splenic hypertrophy with which he is acquainted, and suggests its employment in goitre.

*Gaultheria, Oil of.*—The value of this oil in rheumatism is further exemplified by the experience of Lake<sup>71</sup> who has very successfully treated 18 cases with it, in doses of 20 drops every 2 hours; diminished after 24 hours to 10 drops, and later given not so frequently. Some of these cases he reports in full. In chronic rheumatism, he found it of no value. He failed to observe any depression following its use, though it was apt to induce gastrointestinal irritation, and not seldom had to be abandoned on this account. In his opinion, the oil will lower the temperature as rapidly as salicylic acid, and with less danger of cardiac complication.

The fact that gaultheria is often not well borne by the stomach, was also noticed by Squibb.<sup>72</sup> In some cases, too, it was powerless when the salicylate of soda afterward proved beneficial. There was, however, no dissent in the testimony elicited that the oil was usually very beneficial, and represented one of the best means of obtaining the therapeutical effects of the salicylates in a large class of cases. In all cases where the attacks were not severe, it seemed to have important advantages over the salicylate of soda, but in some instances where the pain was intense and the temperature high, the symptoms were controlled much more effectually by the sodium salts.

*Geranium Maculatum.*—Shoemaker<sup>73</sup> calls attention to geranium maculatum as being one of the most valuable of the indigenous plants of the United States. Its use is not new in medicine, but has been almost entirely abandoned. He has been investigating the virtues of the plant during 5 years. The dose of the powdered root is 10 to 40 grains; of the tincture  $\frac{1}{2}$  to 2 fluidrachms, and of the fluid extract, which is the most eligible preparation, 10 minims to  $1\frac{1}{2}$  fluidrachms. Its range of usefulness is very wide, and it is entirely devoid of harmful properties. In all forms of hæmorrhage it may be advantageously employed, and hæmoptysis can usually be arrested by drachm

doses of the fluid extract given hourly. Epistaxis is controlled by syringing or plugging the nostrils with cotton wet with 1 part of the fluid extract mixed with 3 parts of water. So also obstinate hæmorrhage after the extraction of teeth may be restrained by plugging the cavity with cotton wet with the undiluted extract. Uterine hæmorrhage may also be controlled by the drug, used both internally and externally. The value of geranium depends clearly on the tannic acid which it contains, and we may expect it to be beneficial in various other affections where the acid would be indicated. The author recommends its use in diseases of the hæmorrhagic diathesis; diarrhœa from various causes, in which it may with advantage be given by injection; ascarides; phthisis, for the night sweats, diarrhœa, and spitting of blood; chronic bronchitis; and various gastric affections. Cases of anæmia and chlorosis and diseases secondary to them, in which iron and quinine have been of no benefit, frequently improve at once under its influence. All relaxed and diseased states of the mucous membranes are relieved by it. He claims that when applied undiluted to fissures of the anus, it will relieve the pain at once, and that a permanent cure may be effected by continuing the treatment 2 to 3 times a day for a few days. Various other very different affections, such as cracked nipples, prolapsus ani, pruritus ani, bromidrosis, pemphigus, eczema, bedsores, fœtid lochia, etc., etc., are said to yield at once to its use, and the author further states that it is the best styptic in the materia medica, surpassing even Monsell's solution in power.

*Glycerine.*—A Dutch patent medicine used as an enema for the relief of constipation, was found by Anacker<sup>25</sup> to depend for its virtue simply on glycerine. He found that 20–30 minims of glycerine injected into the rectum, quickly evoked a full evacuation. This is due, probably, to its hygroscopic properties, which increase the activity of the circulation and set up increased peristalsis. Vámosy<sup>58</sup> has administered these injections in about 150 cases of constipation, and found them convenient, easy to take, prompt and sure. Defecation was painless, though in every case in which the injections were used, there had been constipation for at least 2 days. In fact, the greater the fecal mass present in the intestine, the more energetic and complete did the action of the glycerine enema seem to be. The evacuation followed the injection

as a rule after an interval of 1–2 minutes. Only exceptionally—a patient with cerebral hæmorrhage or other greatly constipated habit—did the interval last from 1 to 2 hours. The stools were always well formed.

The experience of the editors with this method has been very satisfactory. An enema of such small bulk is not unpleasant to the patient, nor difficult of administration, and the evacuation follows very frequently in about 10 minutes. In a few instances only have we found it to be delayed longer than this, or not to occur at all, and it has but rarely proved irritating.

*Guaiac.*—Sir James Sawyer<sup>74</sup> has found guaiac useful in amenorrhœa, especially when there is no obvious spanæmia to which it is probably due. He gives 10 grains stirred in milk every morning before breakfast and continues it for some weeks. Occasionally some abdominal pain and purging are produced. During painful menstruation, he administers the ammoniated tincture in doses of  $\frac{1}{2}$  to 1 drachm every 2 to 3 hours until the pain is relieved. The remedy is valuable where there is no evidence of mechanical obstruction or of local inflammation.

*Hamamelis.*—In the course of a review of the therapeutic properties of hamamelis, J. V. Shoemaker<sup>13</sup> states it to be a most efficient remedy in epistaxis; though if the pulse be rapid and bounding, it must be combined with veratrum viride and morphia in order to obtain good results. He uses the fluid extract in doses of 1 drachm every 1–3 hours. In 2 cases of hæmophilia, 1 of hæmatidrosis, and in 3 of hæmorrhage from the bowels, he found it useful where other remedies had failed. 2 very obstinate cases of purpura rapidly and permanently recovered after being placed upon the drug. In varicose veins, Shoemaker's success with the internal use of hamamelis, combined with a compress externally, has been most satisfactory, and confirms the experiences of Musser, published 4 years ago. Owen<sup>13</sup> publishes the results of inquiries made and answers received from 43 English physicians regarding their experiments with hamamelis. The majority agreed that the drug given internally is useful in epistaxis, hæmorrhoids whether bleeding or not, the hæmorrhagic diathesis, chronic catarrh of the uterus, catarrh of the upper air-passages, prolapsed rectum and some forms of diarrhœa. Locally, its employment is recommended in hæmorrhoids, hæmorrhages from

various regions of the body, and several miscellaneous conditions. Sickness and great depression followed its use in a patient with dilated heart.

*Hippurates*.—Poulet<sup>75</sup> believes that the acidity of the stomach at the commencement of digestion is due to hippuric acid; and he therefore advises the employment of its salts in certain diseases, viz., hippurate of lime in cystitis, lithiasis, affections of the liver, and various diseases of the skin and of the mucous membrane. It is also useful in diabetes, diseases of the bones, dyspepsia, difficult dentition, etc., etc.; hippurate of lithia in gravel, gout, rheumatism and albuminuria; hippurate of iron as a tonic, etc., etc. So great a list, in fact, that we cannot but wonder to what extent any of them are in reality aided by it.

*Hydrargyrum*.—*Mercury*.—Chaves<sup>8</sup> recommends the salicylate of mercury as a very valuable preparation of the metal. He has succeeded in curing with it syphilitic eruptions which had resisted all other medication, including mercury in other forms. It is well borne by the stomach in doses of 0.025 grams a day. It is also very serviceable externally in the treatment of syphilitic and other cutaneous eruptions. Mercury as an emmenagogue is recommended by Illingworth,<sup>35</sup> the red iodide being the preparation used. For 3–4 years he has employed it successfully in a large number of cases. In this connection we may mention the statement of Payne<sup>21</sup> that *hydrargerum cum creta* is an oxytocic more prompt and certain than ergot. The movement of the bowels which it induces is accompanied by strong uterine contractions. Illingworth<sup>8</sup> further recommends the biniodide of mercury in the germicidal treatment of scarlet fever and diphtheria, and claims that these diseases may often be aborted by its use.

Schadeck<sup>35</sup> has given the carbolate of mercury in 35 cases of syphilis, and without producing any gastric disturbance. In 10 of these the medicine was administered hypodermically into the muscles of the gluteal region. Balzer<sup>40</sup> has followed the hypodermic method of the administration of calomel, but has substituted vaseline for the vehicles generally employed; he has also used the yellow oxide of mercury in the same way, giving the injections deep into the nates. Almost no pain attends the injection, and only a slight inflammation follows after a few days. In a former experience he had 15 abscesses in 107 injections made in 51 cases. More

recently he has reduced the number of abscesses to 4 in 100. Besnier<sup>53</sup> also reports his experience with the hypodermic use of calomel and of the yellow oxide, but thinks the method should be reserved for cases which show themselves rebellious to other treatment. Hull<sup>49</sup> recommends the employment of calomel by the mouth in large amount in epidemic dysentery. In some desperate cases he found drachm doses produce prompt results. It acts rapidly upon the liver, and exerts an antiseptic influence on the contents of the intestinal tube.

But it is the revival of the employment of mercury as a *diuretic* which is most prominent in the medical literature of the metal during the year. Rosenheim<sup>5</sup> has treated 16 cases of cardiac dropsy with calomel. On the 2d or 3d day, a great though temporary increase in the urinary secretion was observed. On repeating the doses diuresis was not reproduced. Unfortunately stomatitis was produced in 11 cases, and in 3 of these it was so severe that teeth were lost. 8 cases of uncomplicated Bright's disease, were also treated with calomel with excellent results in one case, moderate in 3, and with no effect in the balance; while all of them developed stomatitis and diarrhœa. He says that sublimate, in doses of 0.001–0.002 grams possesses a diuretic action as strong as that of calomel, but is apt to cause vomiting and gastric pain, though it and some other preparations of mercury are not so liable to produce stomatitis. Meyjes<sup>25</sup> studied the diuretic action of calomel in 15 cases, and found good results in 8, while in the remaining the good effect was slight or absent.

Orioli<sup>77</sup> concludes that 0.50–0.60 grams of calomel per day exercises a decided though a temporary diuretic action in the œdema of heart disease, when digitalis, caffeine and squills have failed. The diuresis usually reaches its maximum on the 2d–4th day. If it has not commenced by the 8th day of treatment, it will not appear at all. The author also calls attention to the necessity of repeating the treatment when the diuresis has ceased, and to the danger of the occurrence of stomatitis and diarrhœa. Cohn<sup>12</sup> has examined 20 cases for the diuretic action of calomel, and found that though it was successful in some of them, the secondary effects were exceedingly unpleasant. Severe stomatitis occurred in all but one case, and in all there was profuse diarrhœa. He thinks this method is only to be used as a last resort. Biró<sup>78</sup>

tried the effect of calomel in 24 cases of different diseases. In heart disease (9 cases) it failed to produce diuresis in but one instance. Its action commenced on the 3d–4th day and reached its height on the 5th–7th, and from that time gradually diminished. In other affections the results were usually not so good. Stomatitis was observed in every instance where diuresis was produced. Diarrhœa could be prevented by the use of small doses of opium, without interfering with the desired action of the calomel. Biegański<sup>45</sup> has made a series of experiments on the use of calomel and other preparations of mercury, and concludes that after 2–10 days they exhibit undoubted diuretic power; especially when œdema exists as the result of insufficient cardiac action. The presence of renal disease diminishes or even stops the diuretic effect of the mercurials. Medium or large doses are required, and are most powerful when given subcutaneously. He believes the diuretic action of mercury to be most probably dependent on a stimulation of the secretory activity of the kidneys, which it produces as it passes through them. Leyden<sup>5</sup> has found calomel active as a diuretic in several cases of heart disease, and in 1 case of cirrhosis of the liver. Gerhardt,<sup>5</sup> on the other hand, writes that gastro-intestinal hæmorrhage producing death, almost immediately followed its employment in a case of cirrhosis under his care. Nothnagel<sup>5</sup> reports striking results with 0.2 grams of calomel 3–4 times a day in 2 cases of heart disease where caffeine, digitalis, and salicylate of soda had exerted no diuretic action. He administered chlorate of potash simultaneously to forestall the action of the mercurial upon the mouth; and says that opium may be employed to control the diarrhœa. The urine increased to 2–5 litres a day. It is necessary to continue the administration of calomel if it is desired to sustain the diuretic action. Brainerd<sup>79</sup> reports a case of an old man, already slightly comatose, and with such anasarca that he was “drowning in his own urine,” and for whom diuretics of all sorts had been employed in vain. 2 doses of calomel, each of 5 grains with bismuth, were given an hour apart, and in about 8 hours profuse diuresis set in and continued nearly 36 hours, in which time the patient passed 24 pints of urine. In a second case of dropsy from hepatic disease, the diuretic action of calomel was also marked.

It seems clear, from the combined evidence of the writers

quoted, that calomel is capable of acting as a powerful diuretic, especially in the dropsy of heart disease. In cirrhosis of the liver, Bright's disease, and pleural effusion, its action is not so sure, though the remedy may be tried with hope of success. It is quite certain, however, that stomatitis will be produced by doses sufficiently large to procure diuresis, and it would seem wisest to use this plan of treatment only when other means had failed.

*Hydrastis Canadensis*.—Though containing no new matter, we yet desire to call attention to the excellent review of Langgaard,<sup>25</sup> which consists of an epitome of our knowledge of this drug, and a list of important publications concerning it.

*Hydrochinon*.—Sylvestrini and Picchini<sup>80</sup> have made some observation on hydrochinon, as a result of which they reached conclusions diametrically opposed to the unfavorable ones usually entertained regarding it, viz., that though a powerful antipyretic, it is a very dangerous one, liable to produce depression, rigors, and profuse sweating. These observers, on the other hand, believe it to be prompt, powerful, perfectly harmless even in large doses, and far superior to other drugs of the same class. In acute rheumatism, typhoid fever and erysipelas it not only diminishes the temperature, but removes the disturbances of pulse, blood pressure and of the urinary secretion. It is also unirritating to the alimentary canal, and, being an antiseptic, arrests fermentation there. Its dose is from 5–30 grains in water, in which it is freely soluble, and it may be given either by the mouth or hypodermically. In the presence of so much evidence opposed to these statements it is best to accept the correctness of these results with some caution, and to administer the drug carefully, if at all.

*Hydrogen Peroxide*. (See also *Oxygen*.)—Henning<sup>81</sup> has been favorably impressed by the external use of the peroxide of hydrogen. One case of very chronic eczema of the hands which had resisted all other treatment employed, yielded to this substance applied with the atomizer. In another instance it appeared to be of benefit in healing chancre when applied in the same way twice a day. He has also given it by inhalation—thus producing oxygen (q. v.)—in various cases, especially of pulmonary trouble, with decided benefit. The dose employed was 1 drachm a day through an inhaling bottle. Richardson<sup>17</sup> speaks highly of peroxide of hydrogen in whooping-cough, and says that when given



in the acute stages and used alone, he has never seen the disease cut short so quickly by any other plan of treatment except change of air. He gives it in the dose of a fluidrachm, as in the following formula: Hydrogen peroxide, 6 drachms; glycerine, pure, 4 drachms; distilled water to make, 3 ounces. S.—A tablespoonful in a wineglassful of water 5–6 times a day. Ozonic ether may be substituted or added to it when there is stridulous spasm with the cough.

*Hydrocyanic Acid—Chloralcyanhydrate.*—Hermes<sup>15</sup> recommends chloralcyanhydrate in place of all other preparations of hydrocyanic acid. It is a crystalline powder, soluble in alcohol, ether and water. In substance and in aqueous solution it does not undergo decomposition. It is unvarying in its composition, and thus allows of exact dosage. 6.46 grams of it contain 1 gram of prussic acid.

*Hydrogen Bisulphide.*—(See *Sulphur*.)

*Hygrophila Spinosa.*—Jayasingha<sup>13</sup> states that the practitioners of medicine in Ceylon consider this one of the best drugs for dropsy. It is also used by the native practitioners of India, in the form of the ashes of the burnt plant. The author usually gives 1 pint of the infusion of 2 ounces of the dried plant in divided doses during the 24 hours. In a series of cases of general dropsy due to anæmia, malaria, or possibly to anchylostoma duodenale, where digitalis and other remedies had had no effect, he administered the infusion with excellent results. He reports these cases in full, but does not tell us in what way the medicine appears to produce increased diuresis, or what, if any, unfavorable symptoms may accompany its use.

*Hyoscine.*—Tirard<sup>10</sup> recommends the use of hydrodate of hyoscine in cases of sleeplessness in severe Bright's disease, where other remedies fail and morphia is inadmissible. He reports the case of a man whose urine was nearly solid with albumin, and who could scarcely sleep at all on account of asthmatic attacks. He at first administered bromides and chloral, but these soon lost their effect, and cannabis indica proved of no service. The patient was then put on  $\frac{1}{100}$  grain of hyoscine hypodermically, which procured refreshing sleep. This was preceded, however, by slight delirium, lasting several hours, but which seemed to have no bad effect on the patient. Erb<sup>15</sup> saw some amelioration of the symptoms of paralysis

agitans follow the use of the different salts of hyoscine, in doses averaging 0.00025 grams. He found the 3 salts, hydrobromate, hydrodate and hydrochlorate, of about equal value. In 10–12 severe cases the tremor sometimes disappeared completely for from several hours to a half a day. The drug proved valuable in tetanic, post-hemiplegic chorea and some other diseases. Yet it has unpleasant secondary effects, such as vertigo and dryness of the mouth and throat, and is not without danger. Kobert<sup>25</sup> regards hyoscine only a feeble hypnotic for healthy men, and one which may be used when other narcotics fail. In mental diseases, on the other hand, it acts so powerfully that no other remedy can rival it.

*Hypnone*.—The place which hypnone will finally take among the hypnotics is still unsettled, though it certainly seems to be inferior to some other drugs of this class. Seifert<sup>27</sup> says it always has a more or less hypnotic action without unpleasant secondary effects. He found, however, that patients soon became accustomed to it. Mairet and Combemale<sup>82</sup> state that it is possessed of but feeble hypnotic power, and that the quantity necessary to produce sleep in animals is in reality toxic. In large doses it is a cardiac and respiratory paralyzer, and produces a coma not at all like natural sleep. They administered it in 22 cases of insomnia in various mental disorders, in only 2 of which was any hypnotic action obtained; and even here the drug acted indirectly by allaying muscular agitation and unrest, and thus favoring a disposition to sleep.

*Ichthyol*.—This substance, a distillation product from the deposits of prehistoric fish and marine animals, which was first used by Unna for various affections of the skin, has received much attention during the year, though chiefly in the way of critical reviews of the knowledge we already had concerning it. Such, for example, is the paper of Lartigau.<sup>41</sup> Schmidt<sup>49</sup> has treated with it over 30 cases of tumefaction of joints or muscles, whether due to rheumatism or trauma, and has never failed to remove the swelling in from 1–4 days. On joints he uses a 25 per cent. solution of ichthyo-sulphate of ammonia, and on muscles 2 drachms of 30 per cent. of ichthyol, with 1 ounce of lanoline well rubbed in. But he agrees with Binz, Nussbaum, Eulenburg and others, in considering its most important employment to be in

rheumatism, and that it excels in remedial power the salicylates and the alkalis. He has succeeded in curing a number of obstinate chronic cases of this disease with ichthyol in 3–5 drop doses continued for several months, and recommends that it be given further trial.

*Indigo*.—Yount<sup>83</sup> recommends the use of indigo as a safe, trustworthy and painless emmenagogue. Though not soluble in water or alcohol, it can readily be dissolved in strong sulphuric acid, which so changes its character that it may then be easily dissolved in water without change of color. It is without odor or taste, and may be administered in doses of 1–4 drachms of the powder, but is very liable to induce nausea and vomiting. He was first led to use it about one and a half years ago, by the discovery that one of his patients had several times employed it with success to cause miscarriages in her own case. He first administered the crude drug to a number of patients, but nausea was common, and he employed more recently a concentrated extract of which 5 grains equal 26 grains of the crude drug, and with which in 5 grain doses 2–3 times a day in capsules the nausea has been avoided, though the effect on menstruation is the same.

*Iodine — Iodides*.—Casson and Brownen<sup>19</sup> say that it has come to be an accepted fact that night is the most favorable time for the development and propagation of contagion, perhaps because sun and air are excluded, the house is closed and the exhaled impurities accumulate. It therefore occurred to the authors that if the material employed for lighting during the night could be utilized for the evolution of a true disinfectant, a useful adjunct to other means of treatment would be obtained. Iodine has been classed by Koch as one of the few effective disinfectants. The authors found that when combined with salicylic acid, it could be incorporated with fats, wax and paraffine, made into candles, and then when these are ignited, iodine and phenol are set free in a gaseous form. The phenol comes from the decomposition of the salicylic acid, but being an organic product is entirely destroyed, when the combustion is rapid and complete. The iodine, however, is completely volatilized and can be detected chemically in the air. These candles produce a very faint odor of iodine when burned in quantity, and are very effective in deodorizing the air of sick rooms, etc. In several cases of asthma, spasmodic croup and bronchial

catarrh, the patients experienced great relief from the iodine vapor. The writers are making experiments with a view to charging oil for lamps with iodine and thus disinfecting on even a larger scale. Another use of iodine is that proposed by England,<sup>68</sup> who employs *iodized starch* as an antiseptic dressing for wounds. He applies it as one would iodoform or subiodide of bismuth, and considers it equal and in some cases superior to either of these.

The *subiodide of bismuth* has been largely used during the year as a substitute for iodoform, as it is free from the disagreeable odor of the latter. Ogg<sup>34</sup> has employed it in quite a number of cases of specific and non-specific ulcerations, and has found it very useful, though he does not consider it as good as the tincture of iodine or iodoform for packing abscess cavities. Chassaignac<sup>37</sup> reports a case of ulcerated stump after amputation, where various other measures, including skin grafting, had been tried without success, and where the subiodide of bismuth effected a cure in a very short time. It is excellent in foul ulcers which cannot be dressed frequently.

*Iodine Trichloride.*—Langenbuch<sup>20</sup> publishes a long article upon this disinfectant and antiseptic substance. Carbolic acid and sublimate are poisonous and cannot be used freely in surgery, while chlorine water smells so offensively, and the gas given off has such an effect on the respiratory organs, that some other form of chlorine is to be desired, capable of discharging chlorine freely under the proper conditions. For this purpose the author recommends the trichloride of iodine, a volatile crystalline substance, freely soluble in water. For use in surgery, he employs an aqueous solution of 1 part in 1000–1500 parts. This solution smells of chlorine and somewhat of iodine, and should be kept in yellow glass bottles. Experiment shows the drug to stand next to corrosive sublimate in its microbicidal properties. Like all disinfectants, it is not absolutely non-poisonous; but trial on animals had demonstrated that there is no reason to fear it in surgical work, and the author has always found it harmless, even when applied to the abdominal cavity. Hundreds of operations have been performed in his wards, in which the use of iodine trichloride in the dressings has entirely superseded carbolic acid or corrosive sublimate; and he reports several interesting and severe operations in which it was employed. As to the danger from any

absorption of the iodine (the chlorine is probably not absorbed at all, but is at once converted into hydrochloric acid and unites with the alkalies of the tissues), an easy calculation shows that there is no possibility of this occurring in any amount exceeding  $\frac{1}{3}$  of the maximum daily dose of iodine as given by the German Pharmacopœia; and that the amount of iodine actually tolerated by the system is far in excess of this. The author has given the drug internally in teaspoonful doses of the solution every 2 hours, for dyspepsia due to the presence of bacteria. Several cases of cutaneous disease were cured by its external application, and its injection in gonorrhœa has proved serviceable.

*Iodoform.*—The journals of 1887 have been full of the “Iodoform Question,”—the question concerning the reliability of this substance as an antiseptic. From a clinical standpoint, the studies of König,<sup>15</sup> Bruns,<sup>15</sup> Sattler,<sup>84</sup> Mosetig-Moorhof,<sup>2</sup> and others, indicate that iodoform either has an antiseptic action, or at any rate prevents suppuration and aids healing in a surprising manner. Of course the importance of the drug as an antiseptic dressing will depend on the final conclusions resulting from this discussion, and a further experimentation; though the value of iodoform as a stimulant or as an anæsthetic in the treatment of wounds need not be affected by the decision. In the packing of cavities with iodoform, Gersuny<sup>85</sup> recommends the use of “iodoform wick” in place of gauze. [The author does not refer to *woven* lamp wick, but to that composed of 12–15 strands of yarn gathered into a bundle.] It has the advantage of being thinner than the gauze, and more easily removed from any cavity into which it has been packed. When there is but a small amount of pus, the wick will insure good drainage; but if the suppuration is considerable, a drainage-tube must also be employed. Bruns<sup>15</sup> reports favorable results in 254 cases of cold tubercular abscess, obtained by first aspirating the pus under antiseptic precautions, then injecting a 10 per cent. mixture of iodoform of glycerine and alcohol, and finally closing the opening with iodoform collodion. No constitutional or local symptoms followed except in one case. In a small abscess only one injection is needed, but for larger ones 2–3 are required, performed at intervals of 3–4 weeks. Under this treatment 40 of the cases recovered,—an exceedingly favorable showing for a condition so difficult of cure. Microscopical examination of the

abscess walls in some of the cases showed that the tubercular nature had been destroyed.

As regards diseases of the *respiratory apparatus*, Bernheim<sup>86</sup> treated a case of tuberculosis pulmonum with subcutaneous injections of 5 grams of iodoform in 30 grams of ether. Improvement was evident after eight days, and after further treatment combined with tonic measures and counter-irritation, the patient recovered. Three other cases of pulmonary diseases were successfully treated in the same way. The injections are not painful if practiced in an adipose region. After a few days they should be given morning and evening, and persisted in for several weeks. Bouchut<sup>87</sup> has tried Warfinge's treatment of tubercular meningitis by the rubbing of iodoform into the scalp. He employed it in three instances, but totally without effect. In other cases of non-tubercular meningitis the result was in like manner negative. Iodoform has also been employed hypodermically, dissolved in vaseline, as recommended by Meunier. (See "*Vaseline*.")

*Iodol—Tetraiodpyrol.*—This odorless and tasteless substitute for iodoform has shared to some extent in the discussion concerning the antiseptic power of the latter. Sattler<sup>84</sup> thinks it not at all inferior to iodoform in antiseptic value, but believes that both are only capable of retarding the development of bacteria in the tissues with which they are in immediate contact. Iodol in powder is, however, less suited to open wounds, on account of a degree of pain which it produces. Yet the author prefers the iodol vaseline to that made with iodoform. Seifert<sup>27</sup> reports cases of tubercular ulceration of the larynx treated by insufflation of iodol several times a day, but with only temporary benefit. In some instances the laryngeal ulceration healed, but the patients died from tuberculosis of the lungs. He has also used iodol successfully in syphilitic ulceration of the nose. In a case of struma hyperplastica he administered 7 grains daily in pills without the production of any digestive disturbance or evidence of iodine intoxication. Fliesburg<sup>21</sup> has used it in about a dozen cases of ulcers of various parts of the body, in which it has acted as well as or better than iodoform. One of the best papers we have seen upon this drug is that of Wolfenden.<sup>79</sup> After reviewing its chemical and other characteristics, with some of the uses to which it has been put, he details his own experience with it in disease of the throat. Of the

preparations to be employed, perhaps the one most generally useful is the pure unmixed powder, with which the diseased part must be well covered by insufflation; or we may apply iodol, 1 part; alcohol, 16 parts; glycerine, 34 parts, with a brush or as a coarse spray. For naso-pharyngeal atrophic conditions iodol 1 drachm, ether 1 ounce, applied by the spray, is very useful. Another very soothing application in pharyngeal disease is iodol 1 drachm; glycerine, 1 drachm; vaseline, 7 drachms, warmed before using. For chronic affections of the pharynx, we may give iodol pastilles, each containing 1 grain, and  $\frac{1}{2}$  grain bougies may be used in diseased nasal states. The author has seen ulcerations in the arytenoid region heal completely, and the characteristic arytenoid œdema diminish greatly under the use of iodol. The distressing pain of tubercular ulceration of the pharynx and epiglottis is often completely relieved by it, and in some instances deglutition has become comparatively easy. If the iodol is carefully and thoroughly applied over the ulcerations it will heal them. It also remarkably diminishes the cough. Of course, neither iodol nor any other substance will cure extensive phthisical disease of the larynx, though in these advanced cases it arrests the ulceration and gives great relief. The foul smell of ozæna is removed by iodol tampons, and atrophic naso-pharyngeal catarrh is well treated by the spray or brush. For ordinary simple or follicular pharyngitis insufflation or the pastilles may be employed.

It is very important that the application of iodol or of any other medicament be preceded by a thorough cleansing of the parts with an alkaline lotion, in order that the medicine may come into direct contact with the diseased tissue.

*Ipecacuanha*.—Holmes<sup>88</sup> contributes some interesting notes concerning the value of this drug in disease, confirming the statements of Woodhull published 12 years ago. Ever since that date he has been using ipecacuanha in malarial fever, and has seen certainly 2000 cases treated successfully with it alone, and without quinine. While it is not the equal of quinine in many conditions, it is often a valuable substitute, and sometimes has a decided advantage over it. The author is especially partial to it in hæmorrhagic malarial fever, and has on several occasions seen happy results follow its employment after quinine had proved useless. In this affection he administers a dose of 10 grains

regardless of emesis, and follows this as soon as extreme nausea is over by a pill of powdered ipecac repeated every 3 hours. This will not cause vomiting, since it is much more difficult than is ordinarily supposed to produce emesis with ipecac twice in 6 hours. Not 1 time in 10 will the endeavor succeed. A common feature in malarial remittent fever is the persistent vomiting of greenish, acrid bile, while everything taken into the stomach is rejected. He has never tried any thing so effectual as an emetic dose of ipecac *per rectum* or hypodermically; another dose of one-half the size to be given as soon as free emesis is over, and 2-4 grains administered at intervals until the fever has disappeared.

The drug has still other uses than in malaria. The author reports an interesting case of obstinate epistaxis as a result of which the patient became pulseless and almost exsanguine. Various remedies had been tried, including ergot, a douche of hot water continued 40 minutes, and the plugging of the anterior and posterior nares,—this operation having been performed twice, but with only temporary relief, as the plugs were either forced out or had to be removed on account of pain. The patient was ordered a suppository of 20 grains of ipecacuanha, and in about 40 minutes made extreme efforts to vomit, and the hæmorrhage ceased. When retching had stopped 5 grains of the drug were given, followed by 3 grains every 3 hours; but there was no return of nausea or of hæmorrhage. The author has repeatedly found the drug valuable in minor hæmorrhages. In pulmonary hæmorrhage it has acted without fail in 5 cases. In non-emetic doses he has found it very serviceable in troublesome hiccough, and has further been encouraged by its use in impaired digestion and assimilation, particularly in infancy, in chronic diarrhœa, and as a cholagogue, and suggests its trial in cholera.

*Jamaica Dogwood.*—Payne<sup>21</sup> has found this plant (*Piscidia erythrina*) a useful remedy for nervous persons who cannot bear opiates, and in cases where it is desired to increase rather than check the secretions. It eases pain, promotes sleep, and if it is repeated will gently move the bowels and increase the flow of urine.

*Kola.*—Monnet<sup>89</sup> made some experiments upon the action of the Kola nut,—a species of Malvaceæ used as a relish in Africa. Owing to the caffeine which it contains it is a cardiac stimulant, increasing the force and frequency of the heart's action. It is also



a diuretic, and on this account may become of value in cardiac dropsy. It is useful in diarrhœa, promotes nutrition, and removes the most stubborn disgust for food.

*Lamium Album*.—The employment of this plant in medicine is not new, but has for years been neglected. Florain<sup>24</sup> has given it with success in a case of menorrhagia after the failure of ergot, alum, tannin, and perchloride of iron. He employs a tincture of the stems and root of which about a dessertspoonful is given every half hour until the hæmorrhage stops, and then every 4 hours. Or the alkaloid, lamina, obtained from the fresh stems at the time of flowering, may be given hypodermically.

*Lanoline*.—Wulfsberg<sup>13</sup> gives a very interesting historical sketch of lanoline, or “Æsypum,” as it was called by the Greeks, and quotes from the classical writings of Dioscorides, Celsus, Galen and others concerning it. It was reintroduced into medicine by Liebreich under the title “lanolinum purissimum anhydricum,” and probably now represents the best basis for ointments known. Wulfsberg reports several cases of cutaneous disease in which he used simply lanoline with success, while in others he combined it with various medicaments commonly employed in ordinary ointments. A very troublesome case of pruritus in a woman of 80 years was remarkably relieved by the application of simple lanoline. In a case of prurigo senilis it rendered good service, and in 4 weeks the patient’s condition was nearly normal. One of the most useful combinations of it in the author’s experience is with 10–20 per cent. of boric acid. Under the use of this mixture a case of very violent eczema of the head and hands rapidly recovered. He has employed lanoline as a basis for tarry applications, and has also found a 10 per cent. ergotin preparation highly satisfactory in hæmorrhoids. A *lanolimentum hydrargyri cinereum* with 10 per cent. of fat, or made with anhydric lanoline, is useful in pediculosis. It does not leave irritation of skin which often follows the use of simple mercurial ointment.

Güterbock<sup>13</sup> has found that ointments made with it were with few exceptions well borne when those with fat or vaseline acted injuriously. He has obtained the best results in eczema and in fresh burns. Wende<sup>13</sup> makes great use of it as the basis of a cocaine ointment to relieve itching in burns and scalds. Guttman<sup>56</sup> found that lanoline caused no more absorption through the skin

than lard, this being determined by the examination of the urine for the two salts, and assumes that the same must be true for the absorption of other medicinal substances. As a result of bacteriological studies, Gottstein<sup>20</sup> agrees with C. Fränkel that lanoline, unlike the glycerine fats, has the property of resisting decomposition caused by the action of bacteria. It therefore forms a protection against them, and the author further states that the natural oil of the human body has the same property.

*Lithium.* [See also *Mineral Water and Salicylic Acid.*]—Aulde<sup>18</sup> publishes an interesting article on the use of lithium in the form of the bromide, and reports its action on 20 cases with somewhat vague symptoms, in which it was frequently combined with citrate of potash. In these cases indigestion was frequently complained of, together with some of the following: malaise, irritability, stiffness or pain in the muscles or joints, irregularity of the heart or distressing sensations connected with it, bronchial irritation, insomnia. A very common feature was a peculiar labored action of the heart, the first sound being wavy and almost noiseless, and the second sharp, accentuated and at times ringing. An almost constant symptom was a high degree of acidity of the urine. In all of the cases recovery took place under the use of lithium, the improvement sometimes being coincident with the secretion of urine of neutral reaction, the heart-sounds becoming normal in character. These cases seem to have been instances of the uric acid diathesis, relieved, as it so often is, by the use of lithia. In forming our estimate of its worth in these instances, we must, however, bear in mind that bromine was one of the constituents of the salt given, and that at least some of the improvement may have been due to it.

*Lobelia—Lobeline.*—Lobeline, the alkaloid of *lobelia inflata*, has been studied by Bartholow<sup>80</sup> both experimentally and clinically. It is too harsh and depressing to be used as an emetic, and in ordinary medicinal dose it does not nauseate. As it is not depressing to the heart the author has given it with success in some cases of cardiac asthma, when with difficult breathing there was associated a rather feeble cardiac action. In pseudo angina pectoris the alkaloid was efficient; but it is in true asthma that it proved itself valuable, being superior to the crude drug. Lobeline is also an effective expectorant, especially when the cough is of a

spasmodic nature. It promises well in epilepsy, chorea, and the spasmodic neuroses generally. The dose employed by the writer was  $\frac{1}{100}$ — $\frac{1}{20}$  grain of the hydrobromate.

*Manaca*.—Payne<sup>21</sup> considers manaca (*Fransesca uniflora*) one of the best therapeutic agents in rheumatism, rheumatic gout and eruptive diseases of syphilitic origin. He has prescribed the fluid extract in doses of 8–20 drops three times a day in many cases during the last 8 years, and found it of unquestionable benefit, especially in secondary and tertiary syphilis. In these conditions it has seemed more prompt and satisfactory than either iodide of potash or bichloride of mercury.

*Menthol*.—The use of this substance in phthisis has been recommended on account of its antiseptic qualities. Rosenberg<sup>15</sup> has employed it both internally, in doses of 1 to 1.5 grams 6 times a day, and by inhalation. He claims to have obtained favorable results. The appetite is increased and the night-sweats, cough, and sometimes the temperature decreased; though the bacilli do not seem to be destroyed. During his experiments with hypodermic injections of vaseline, Meunier<sup>11</sup> used and now recommends menthol dissolved in it in the proportion of 10 to 90. He used it as a microbicide in phthisis, as well as in other diseases of bacterial origin. His success is reported good; but the actual value of menthol or any substance recommended on this theory needs, the editors think, to be carefully investigated and not rashly accepted.

*Methyl Chloride*.—Eichholz and Genther<sup>12</sup> say that during the whole time in which chloroform has been used there has been an effort to displace it by some other drug free from its dangers. Theoretically, methyl chloride should prove less dangerous, as it contains an atom less of chlorine; yet in practice it has failed to supplant the more toxic substance. One reason is that the good effects of methyl chloride were at first greatly exaggerated, and the results were proportionately disappointing. The other and the chief reason is that the material usually sold as methyl chloride is not it at all, but a mixture of methyl alcohol, and chloroform. The authors claim that the substance so highly praised by Spencer Wells years ago was nothing else than this mixture, and the chemical experiments which they have made seem to prove this. They doubt, in fact, whether any of the methyl chloride used in

England was genuine. In like manner they investigated some of the samples that came from several German chemists and found them all impure. They claim, therefore, that pure methyl chloride has never yet been used as an anæsthetic in medicine. The authors gave the drug to about 30 patients, in some of whom the anæsthesia lasted an hour. In no case was there cyanosis, temporary cessation of pulse or respiration, or other similar threatening symptoms. On the other hand, there were seen sometimes during a stage of excitement, especially in those addicted to the use of alcoholic beverages, very unpleasant secondary effects, such as convulsions, pallor, trismus, and unrest. The pupils were almost always dilated. After the narcosis there was generally vomiting, or at least nausea. The employment of methyl chloride therefore has its disadvantages, though it is certainly much safer than chloroform. The amount needed is small,—about 15 ccm. for men and 10 for women.

Quite a different use has been made by chloride of methyl by Debove.<sup>9</sup> This author has treated over 150 cases of sciatica, besides others of lumbago and neuralgia, by its external application. If not used superficially, it is too irritating, and will produce congelation of the skin, erythema, vesication, and cauterization. He has cured with it 16 out of 18 cases of facial neuralgia. Its good effects in the latter affection are confirmed by Dumontpallier.<sup>9</sup> The chief objections to methyl chloride as an anæsthetic are the high price and the difficulty of obtaining it in a pure state.

*Methylal*.—Still another hypnotic, methylal, has been coming into prominence. It was discovered in 1839, and its action on animals was tested years ago by Richardson,<sup>19</sup> who also stated that it could be given to man, and acted as an hypnotic. He has frequently prescribed it disguised with orange-flower syrup in doses of 1 to 4 drachms, but found that it rapidly loses its effects, and that the dose must be increased. It is a volatile liquid, freely soluble in water, and Richardson says that when pure it is almost tasteless, though it bites the tongue, and that its odor is fragrant and aromatic. Mairet and Combemale<sup>53</sup> have investigated its action and have published an interesting paper on the subject. They made extensive clinical use of it, but only in persons affected with mental disorders. It was given in a single dose of 1 to 8 grammes in water at bed-time. They state that its sweet taste and pleasant odor render its administration easy, and that in these doses it never caused gastric

or other disturbance. In 16 cases of simple mania it had no effect at the beginning; but during the stage of full development with a tendency to violence the drug produced sleep, which sometimes lasted through the whole night. The system became somewhat accustomed to the medicine, but regained its susceptibility when no methylal was given for two or three days. Out of 14 cases of simple dementia 12 were successfully treated by methylal, though sometimes 5 and 8 grammes were required. Here, too, tolerance was soon established, and the dose needed to be increased as the patients became accustomed to the medicine. 3 cases of alcoholic mania were treated without effect. In 3 instances of dementia from atheromasia, methylal proved useful for 5 or 6 days; but after this the effect was not quite so good, even though the dose was increased. In 5 cases of paralytic dementia the results were excellent, and the drug did not seem to lose its effect as time elapsed; but in 2 cases methylal and all other hypnotics failed to produce quiet and continuing sleep. The authors conclude, therefore, that methylal is without effect in alcoholic mania or at the commencement of simple mania, but is valuable in nearly all other cases, though the dose must sometimes be increased. or the medicine stopped for two or three days, in order to avoid the establishment of tolerance. In the paper by Richardson already referred to it is recommended to combine methylal, 90 parts, with nitrate of amyl, 10 parts, in the treatment of angina pectoris by inhalation. This mixture is pleasant to inhale, and the action of the amyl is rendered less sudden and more prolonged. Matrokhin<sup>61</sup> also reports his experience with methylal, both on animals and man. Inhaled, it produces sleep; and during the sleep sensibility to pain is somewhat diminished. Respiration is made deeper and somewhat slower, and the heart is unaffected. That methylal is so innocuous is contended by Popoff,<sup>61</sup> who says that it acts directly on the heart-muscle and renders respiration difficult.

An interesting item, and one which may possibly develop into real practical importance, is that both Matrokhin and Personali declare methylal to be to a certain extent an antidote to strychnia, though the former states that whenever very large amounts of strychnia have been taken, methylal only hastens the fatal result. Methylal is best given by the mouth, though it can be employed

hypodermically. By this method, however, or by inhalation, it is apt to prove very irritating. It seems, then, that the drug is a useful hypnotic in some instances, yet it is decidedly unreliable. Its great cost is also against it, and it appears to us likely that it will not take the place of paraldehyde, and that amyl hydrate will probably surpass it.

*Momordica Bucha*.—Duprat<sup>13</sup> has made a communication concerning this cucurbitaceous plant,—a native of Brazil. It is used only by “quacks,” and is popularly considered dangerous. It may, however, prove useful as a purgative, given either by the mouth or by injections of the watery extract from the fruit. It is a powerful drastic useful in dropsy, but in large doses induces vomiting, and may even cause death.

*Mutisia Viciifolia*.—The seed of this composite plant, growing in Bolivia, are reported by Sacc<sup>17</sup> to be useful in the treatment of phthisis. The Indians have long esteemed it highly for affections of the respiratory apparatus, and have kept the remedy a profound secret; and it was with the greatest difficulty that the seeds could be obtained from them.

*Naphthalin*.—Ever since the valuable paper of Holt<sup>16</sup> on the antiseptic treatment of summer-diarrhœa, naphthalin has received increased attention in the United States. Holt treated 44 cases with naphthalin and castor-oil, with 67 per cent. cured and 15 per cent. improved. He considers naphthalin one of the most valuable of the various antifermentative drugs he has tried for the treatment of diarrhœa. He also reports 7 cases of dysentery and 21 of chronic diarrhœa treated with naphthalin alone. The theory is that summer-diarrhœa is caused by putrefactive changes taking place in the food that has been eaten but not digested, and that the products of these changes act as poisons, either locally or generally, throughout the system. The diarrhœa is at first salutary, and the employment of opium and astringents may even do harm by checking peristalsis and retaining the putrefying matter in the intestines. The action of naphthalin or of salicylate of soda (q. v.) in these cases is to stop decomposition, while the castor-oil cleanses the bowels. It may be given in powder mixed in sugar, or put in capsules or cachets. The taste is not bad, but the odor is tarry and unpleasant. Holt employs repeated doses of 2–6 grains in children, according to the age. In

dysentery, chronic diarrhœa, and typhoid fever he administers it in larger doses,—60 to 90 grains a day.

Another series of clinical experiments were those of Wilcox, who gave naphthalin to 32 patients, and learned to rely on it in some cases implicitly. He insists that it must be administered in large doses, less than 60 grains a day being simply useless. When the drug has been carefully washed with alcohol he never met with unpleasant after-effects; and though the urine frequently became smoky, casts or albumen were never found. He has treated 23 cases of chronic diarrhœa of all sorts, except that of tuberculosis, and succeeded in relieving all of them in from 1 week to 2 months, generally in about 10 days. In 7 cases of chronic dysentery he had equally favorable results. In one of these the patient, a man of 66, had never been free from the affection except for a few weeks at a time since 1862-4. He was sallow and emaciated, but at the end of one month, having taken 90 grains of naphthalin a day, he would hardly have been recognized as the same person, and after four months he considered himself a well man. Only 2 cases of the diarrhœa of typhoid were treated, resulting in a marked diminution in the number of passages and the removal of the offensive odor. Another writer<sup>90</sup> says it seems especially adapted to cases of flatulent dyspepsia and intestinal indigestion, and that it is useful in the diarrhœa of phthisis. A patient suffering from painful dyspepsia, who had not been benefited by the usual treatment, was relieved in a short time by the administration of this drug in capsules.

In a sense distinct from the use of the drug as an antifermentative is its use as an antipyretic in typhoid fever, referred to by Wilcox;<sup>52</sup> although even here it acts indirectly, he says, by disinfection of the intestines.

The editors' own experience with naphthalin supports largely the good opinion held by so many others. They have employed it in the flatulent dyspepsia of adults with success, but have found it especially valuable in summer-diarrhœa of children; given sometimes alone, sometimes in combination. Like all other drugs, it occasionally does not succeed, and it becomes necessary to resort to other measures. To a child of a few months old we have usually given  $\frac{3}{4}$  of a grain every 2 hours, and have never seen any bad effects follow this dose, which many would, perhaps, consider small.

*Naphthol*.—Bouchard<sup>65</sup> expressed his views on naphthol as an antiseptic before the Académie des Sciences. He made experiments in order to determine its toxic and antiseptic powers, and pronounced it to be one of the best and safest antiseptics, owing to its very feeble solubility (0.2 in 1000). To disinfect a surface easily accessible, or to produce general antiseptis, the soluble antiseptics suffice; but there does not exist one, so far as we know, which can be introduced into the blood in sufficient quantities to destroy the vitality of the microbes, yet without danger to the life of their host. For antiseptis in the thickness of the tissues or in cavities difficult of access, such as serous cavities and the digestive tract, we must use an insoluble or but slightly soluble antiseptic; otherwise the danger of its absorption and of its toxic effect is undergone. The author especially recommends the use of naphthol in diseases of the intestinal tract, since we may coat the whole tube with it without risk of absorption, and thus completely prevent the occurrence of any fermentation. Indeed, the toxic dose for a man of 65 kilograms is about 250 grams, while 2.50 grams of naphthol a day will render the intestine aseptic.

*Nitrogen*.—Valenzuela,<sup>42</sup> of Madrid, compares the action of inhalation of nitrogenous air with the antipyretic effect of antipyrine, quinine, and the application of cold. The comparison was made upon 4 cases of tuberculosis. One case of a severe form with fever was transformed by inhalation of this suboxygenated air into one entirely apyretic, while at the same time the night-sweats, hæmoptysis, and other unfavorable symptoms disappeared or grew favorably less. With the other three remedies any fall of temperature produced was followed by an immediate rise if the treatment was suspended. With the nitrogenized air, however, the apyrexia continued, in spite of the discontinuance of the treatment. This is an interesting observation, but needs to be repeated often before any conclusion can be drawn.

*Nitro-Glycerine*.—This substance, becoming a more constantly and generally employed therapeutic agent, has received additional testimony to its value during the past year. Trussewitsch<sup>91</sup> proposes to name it “angio-neurosine,” from its peculiar therapeutic qualities, and because of the difficulties often to be met with in persuading patients to take it on account of its name. Nitro-glycerine is to be used when there is a defect in the equilibrium of the vascular



tone and the blood is irregularly distributed, no matter what the cause may be. It causes a rush of blood to the anæmic regions or a bleeding of the hyperæmic parts. It is consequently valuable in all diseases of this paroxysmal vaso-motor nature, such as angina pectoris, neuralgias, and migraine; also in sea-sickness, some forms of anæmia, syncope, palpitation, and other examples of acute angioneuroses. Still further, it is often beneficial in certain affections of a chronic nature, such as Bright's disease, a weak, flabby heart, and apoplectic attacks. Improvement can always be expected when the symptoms are those of irregular distribution of blood,—a condition which is often indicated by pallor, a weak pulse, and a small, rigid, and rather deeply seated artery. The author avoids giving it for neuralgias in persons whose faces show signs of venous stasis of the subcutaneous veins. So, for example, in cases of asthma, where the face is of this character as a result of emphysema, nitro-glycerine often fails to benefit in the slightest degree. If, however, pallor of the face coexists with the attacks of angina pectoris, migraine, vertigo, shock, toothache, and some cases of sea-sickness, the best anticipations of success with the drug may be entertained. Its regulating effect upon the circulation offers the hope that cases of local congestion of the internal organs may be prevented from advancing to a stage of inflammation or extravasation; the medicine acting like a blood-letting. Thus acute congestion of the lungs can be aborted, the extravasation of blood into the cerebral tissue after apoplectic strokes hindered, an intense congestion of the kidneys repelled, and the severe cerebral and cardiac symptoms or the profuse menstruation of the climacteric be controlled. In all these conditions the pulse is found slow and of low tension. The condition of the pulse is in fact the best indication for the employment of the drug and the dose to be given. The narrower the artery, the more rapidly will it dilate and the less are the secondary effects; while the fuller the pulse and the more distended the artery, the less does nitro-glycerine affect it; and, finally, the softer and weaker the pulse, the greater are the secondary effects and the easier does excessive constitutional action of the drug make itself seen in the organism. It is best, then, to begin with drop doses of a 1 per cent. solution in cases of the first variety, and this will often be sufficient; but with a full pulse satisfactory results cannot be obtained with less than 2 drops, though

it is always safest to give an experimental dose of 1 drop. In cases of weak and soft pulse it is not safe to begin with more than  $\frac{1}{4}$  to  $\frac{1}{2}$  of a drop. It is a good rule never to commence with a dose of over  $\frac{1}{2}$  of a drop in anæmic, exhausted, or old persons. Organic heart-disease does not seem to constitute any contra-indication to the use of nitro-glycerine, but the presence of atheroma is a ground for great caution. After the trial dose the patient's sensation of pulsation and pain in the head, as well as the character of the radial pulse, will afford an index for increasing it. The effects of the medicine should be perceived in a few minutes. After a time the patient becomes accustomed to a certain dose and ceases to feel any symptoms after taking it, this constituting an indication to increase the amount; as unless the pulse or its objective symptoms give some sign the medicine is doing no good.

Trussewitch lays great importance on the proper method of administration, which is the dropping of the medicine directly on the tongue or the giving it in a chocolate-tablet, so as to bring it into the closest contact with the mucous membrane of the upper digestive tract, since it has been proved that it is absorbed very rapidly from it. Introducing it diluted with water into the stomach gives the poorest therapeutical results, and, given in this way, the organism will much sooner need an increased dose. After a certain degree of tolerance of the drug has been reached, intermission of the treatment for one or two weeks sometimes restores the susceptibility of the organism to it.

Van Goidtsnoven<sup>92</sup> reports some very interesting examples of the employment of nitro-glycerine in severe cases. In one instance a patient with acute alcoholism and with feelings of intense sinking in the pit of the stomach and marked cerebral anæmia was cured in 6 hours by 1 drop of the 1 per cent. solution given every 2 hours. A case of intense collapse and impending death after dysentery, was resuscitated for 24 hours by 2 drops. An intensely interesting case was one of cancer of the intestines, where 1 drop upon the tongue as the patient was apparently dying at first caused a convulsive stiffening of the frame and apparent death, followed in less than 3 minutes by increase of the vital force, so that the patient sat up in bed, became talkative, and conversed in an intelligent and rational manner. This state of exhilaration lasted about 4 hours, when again death seemed to be present, to be again driven

back by the drug, this process being repeated during 72 hours. Other interesting cases are reported of revival from an apparently dying condition brought about by the use of nitro-glycerine. The author rightly esteems it as a valuable remedial agent.

*Oxalic Acid.*—Poulet<sup>93</sup> recommends oxalic acid as by far the best of all emmenagogues, though it does not prevent the neuralgic pains experienced by many women whose menstrual functions are normal in other respects; nor does it relieve amenorrhœa caused by organic disease. Whenever the amenorrhœa is due to some functional disturbance or to some temporary cause, such as chilling of the body, taking cold, etc., oxalic acid is, he says, the most valuable remedy we possess. It is best given in doses of 2 grains in a tablespoonful of water and syrup every hour at the time of the usual menstrual period.

*Oxygen.*—The employment of oxygen receives a review from the pen of Wallian,<sup>39</sup> of New York. When first discovered, experiments were made with oxygen on animals,—fallacious, probably, on account of the impurity of the gas. Later French and German writers have claimed that there is a saturation-point beyond which the blood cannot absorb any more oxygen; overlooking the fact that, were this true, the human race is seldom situated where there is the least likelihood of ever reaching this point; and still more recent experiments have shown that the affinity of the blood for oxygen is very great, being  $2\frac{1}{2}$  times that of water. The question as to what becomes of the 10–25 per cent. of oxygen absorbed by the blood is not yet satisfactorily settled. With the conditions under which we live, none of us ever receive as much oxygen as the organism is capable of using and really demands. As an inevitable result, the bodily functions are imperfectly performed, and the multiplying forms of disease are the consequence. The indication is then evident to give more oxygen; and though medical mountebanks have made capital out of the word, yet the use of the gas and its principal ally, nitrogen-monoxide, is steadily increasing. The profession recommend it unconsciously every time that a patient is sent to the mountains, to Southern California, on a sea-voyage, or on the plains. Wallian relates a few cases of different diseases, such as chronic gastric catarrh, migraine, dyspnœa, and neuralgia, in which diluted oxygen inhaled 2 to 4 times a day was followed by marked improvement. When the

patient was confined to bed, peroxide of hydrogen was vaporized and inhaled in its stead. Carles,<sup>94</sup> too, gives a history of the employment of oxygen in medicine from the time of its discovery by Priestley, and follows this by describing its method of chemical preparation. Henning<sup>81</sup> has prescribed oxygen (and peroxide of hydrogen) in about twenty cases, and considers it eliminative, restorative, and constructive.

In this connection we may well refer to the relation of peroxide of hydrogen to oxygen, as concisely stated by Henning. When chemically pure, a 15-volume solution of the former should give off at 100° F. oxygen gas in volume 475 times that of the liquid. The method of using it is to add 1 drachm of the solution to 2 ounces of salt water, put the mixture in an inhaling bottle and raise it to a temperature of 100° F., when it will produce about  $\frac{1}{2}$  gallon of oxygen. 8 to 10 inhalations twice a day is the usual dose.

An interesting article on the use of oxygen by enema was communicated by Kellogg.<sup>21</sup> The idea occurred to him that it might in this way be useful in a case of lithiasis by aiding the conversion of the acid into urea after the gas had been absorbed into the portal circulation. The patient on whom the experiment was made had not been benefited by other measures carried on for weeks. After 3 days of treatment with 2 litres once a day by enema the uric acid entirely disappeared. In a short time distressing headaches and bad taste in the mouth vanished, the other symptoms improved, and the patient gained in weight. The author has employed oxygen by enema in a variety of cases, in one of which especially, a case of phthisis, the good results were remarkable, the treatment reducing the febrile temperature to normal. The author claims that oxygen by enema is a method much to be preferred to the gas by inhalation. In the latter method only a small part is absorbed, and in order that any considerable quantity may be taken up by the system, a very large amount must be given, which renders the treatment very expensive. Then, too, it has been stated that very little more oxygen is taken up by the organism when breathing the pure gas than when using ordinary air. When we wish, therefore, to favor metabolism in general, and especially in the abdominal viscera, it is necessary to employ some other method, and to reach the organs through the portal

circulation; and it is apparent that this can best be accomplished by oxygen enemata. The digestion of food can probably be stimulated in this way, and the writer states that he is making some clinical experiments on the subject. Enemata of oxygen may be employed advantageously in a great variety of diseases; in fact, in all in which there is a disturbance of the normal interchange of gases in the lungs, and in which the system suffers from a lack of oxygen; for though the mucous membrane of the intestine is of small area compared with that of the lungs, yet it presents an absorbent surface sufficiently great to allow of the introduction into the system of considerable quantities of the gas. The frequency with which functional diseases of digestion accompany various pulmonary diseases, is additional proof of the relation between the digestive functions and the quantity of oxygen received through the lungs. Clinical experience has shown the writer that the oxygen was well retained, though perhaps not quite so well tolerated as the mixture of carbonic dioxide and hydrogen bisulphide employed by Bergeon; yet, to prove that it was actually absorbed he made some experiments on animals which conclusively settled the point, showing that a few minutes after the enema the blood of the mesenteric veins became of a bright, arterial hue, and returned to its usual venous color as soon as the oxygen was withdrawn.

This method of employing the gas seems to be worthy of consideration. In Bergeon's method of treating phthisis, as we state in another place, we have no great confidence; but the use of oxygen enemata is more encouraging on theoretical grounds, and deserves a further trial.

Another paper of interest was that read by Valenzuela<sup>35</sup> before the Royal Academy of Medicine of Madrid. He studied the effect upon the temperature of animals of subjecting them to oxygen in a pneumatic chamber under increased pressure, and found that it was reduced several degrees. The animals became temporarily torpid and covered with moisture, but very quickly recovered their original condition when the experiment was over. Rabbits in whom septicæmia had been artificially produced had the temperature reduced to normal, and in some cases a single session in the oxygen-chamber destroyed the power of the virus. Patients were then treated by this method. A young man with

pneumonia exhibited a reduction of temperature as a result of it, though we do not gather from the report that the progress of the case was influenced to any appreciable extent. Valenzuela also mentions other cases of pneumonia and of tuberculosis which appeared to have been benefited by the method.

*Opium and its Derivatives.*—In the course of his remarks upon antipyrine, Sée<sup>36</sup> writes that opium possesses a soporific effect before it relieves pain, acting on the brain and not locally on the painful points. Morphia, on the contrary, is generally exciting, and only puts to sleep after it has relieved the pain which prevents sleep. It influences, he says, the peripheral nervous system, and not the brain. The two substances therefore cannot be substituted for one another in therapeutics. Another note on morphia is by Little,<sup>42</sup> who states that slight differences in the method of administration of medicines often influence greatly their effects, and that a dose of morphia which would be powerless to remove cough when given in an aqueous vehicle will promptly effect this object when dissolved in a viscid substance. General employment of narceine is prevented by two difficulties,—its high cost and its slight solubility, which renders it almost impossible to administer it hypodermically.

Laborde<sup>59</sup> has recently extracted a new substance from opium, a product which contains all the narceine without appreciable traces of morphine or any other alkaloid which is toxic or convulsive. There are, perhaps, traces of laudanine and codeine, but not sufficiently large to have any therapeutic influence. This product has advantages over the narceine as previously obtained, in that it is much more soluble and is of superior activity. In doses of  $\frac{1}{4}$  to  $\frac{1}{2}$  a centigram in children of 2 to 4 years of age suffering from whooping-cough, the nocturnal spasms were reduced from 25 to 4, and without disagreeable symptoms or loss of appetite following.

In a case of persistent insomnia where other opiates were not tolerated this new narceine exercised remarkable results. In acute and chronic bronchitis it exhibited a rather sedative action on the cough and the amount of bronchial secretion. In adults the dose of 2 to 3 centigrams is enough for one night, or fractions of a centigram in pilules until 4 centigrams are taken. To children  $\frac{1}{2}$  a centigram may be given in syrup.

*Papain, Papayotin, Papoid, Curica Papaia.*—Morse<sup>18</sup> regards the papoid as a complete therapeutic substitute for pepsin, preferable to it in the digestive diseases of children. In a report of the Royal Society of New South Wales we find that a decoction of the green fruit in vinegar and water is used in Hong Kong as a galactagogue. The topical application of a solution containing not more than 4 per cent. of alcohol will produce a limpid secretion in a virgin breast, nourishing food being required to keep it up.

*Paraldehyde.*—Krafft Ebing<sup>97</sup> has found paraldehyde a most reliable hypnotic, after considerable experience with it. Prolonged use of it produces fewer ill effects than most other hypnotics, though he has seen delirium and epileptiform convulsions and symptoms of chronic alcoholism follow large doses continuously employed.

*Pareirin.*—Dujardin-Beaumetz<sup>42</sup> has been using the hydrochlorate of pareirin for some years in different malarial affections. He reports a case in which 30 grains were given in doses  $\frac{1}{2}$  hour apart. The first day the attacks were shortened, and on the second did not recur, the fever also not returning. Ferreira<sup>24</sup> finds it an efficient antiperiodic, sometimes useful when quinine has failed.

*Phosphoric Acid.—Phosphates.*—Grossich<sup>98</sup> was induced by Kolischer's success in the local treatment of tuberculosis by calcium phosphate to try the same solution in ulcers of the legs, and obtained good results. But as the recovery could not have been due to the calcification of tubercles,—there being none present,—he concluded the phosphoric acid to be the active ingredient. He then began treating all his troublesome cases of leg ulcers by means of compresses with a 10 per cent. solution in water, the application being renewed 3–4 times a day. Encouraged by the result, he tried the acid in various tubercular affections. In a case of caries of the wrist, the hand was immersed for two hours twice a day in a basin of the solution. The member was saved and rendered useful, when otherwise amputation would have been necessary.

*Phytolacca Decandra.*—Todd<sup>10</sup> calls attention to the value of this plant in mammitis. In all cases of threatened abscess of the breast he administered 10 drops of the fluid extract every hour for 3 or 4 doses, then gradually lengthened the intervals. A brisk

purgative is also given and the breast sometimes bandaged, but never poulticed or rubbed. Whenever it is necessary for any reason to dry up the secretion of milk, the drug proves in his hands an unfailing and pleasant antigalactogue.

*Picric Acid*.—Clark,<sup>89</sup> writing from India, says that he has treated in the last  $4\frac{1}{2}$  years over 10,000 cases of malarial diseases with picrate of ammonia, with the happiest results. His success has been so uniform that he has given up the use of the cinchona alkaloids in intermittent fever. Out of 5000 cases, of which a record was kept, picrate failed in but 9, and in these quinine succeeded at once. The dose usually employed was  $\frac{1}{8}$ – $1\frac{1}{2}$  grains 4–5 times a day, given in pill, the average dose being  $\frac{1}{2}$  grain. In malarial headache and malarial neuralgia, the cure was complete and rapid. The drug does not produce headache, deafness, ringing in the ears, or digestive disorders.

*Pilocarpine*.—Wyss<sup>84</sup> states that hypodermic injections of pilocarpine are liable to produce collapse when given on an empty stomach. A hydrochlorate by the mouth has proved useful in his hands in acute coryza, laryngitis, bronchitis and especially in the dyspnœa of asthma. Riess<sup>20</sup> used a hypodermic injection every other day in 30 cases of bronchial catarrh. After 12–15 injections improvement was most marked. In asthma the attacks were reduced from 5–6 to 1–2 a day after a week's treatment, while sleep at night was undisturbed. The drug affects pneumonia very favorably after the crisis is over, expediting resolution in a really remarkable way. Reiss does not recommend in the acute stage of the disease. When given in proper dose, and to persons of proper age, he has found no serious unpleasant secondary effects follow. Yet he has always used it with caution.

*Porpoise Oil* (*Oleum Delphinidæ*).—Experiments recently made by West<sup>60</sup> have shown that the oil from the tursiops tursio has all the medicinal virtues of cod-liver oil, without its disagreeable smell and taste; that it can be taken without nausea by the most delicate stomach, and is easily digested and assimilated. It furnishes new material to the system in greater abundance than any other known oil. He has found it beneficial in phthisis, emphysema complicated with asthma, scrofula and rheumatism. The author has known infantile bronchitis to be relieved almost entirely in 24 hours when treated by the oil internally and applied



externally over the chest. In subacute rheumatism he has seen it act promptly in relieving the stiffness and pain when applied locally.

*Potassium*.—Magruder<sup>3</sup> advises the chlorate in combination with chalk mixture in the catarrhal affections of the bowels in infants. Moore<sup>8</sup> recommends the nitrate of potash as one of the surest remedies in vomiting, having used it for the past 12 years with the happiest results. The dose should be  $\frac{1}{4}$  grain in a tablespoonful of cold water every 4 or 5 minutes until the vomiting is stopped, which will usually be from 10 minutes to  $\frac{1}{2}$  hour. Johannesen<sup>91</sup> believes that the secretions of the mouth and nose accumulate during the night and undergo more or less decomposition, thus favoring the action of the diphtheritic germ. He therefore advises washing out the mouth and nose of children every night with a clear red solution of the permanganate of potassium.

*Pulsatilla*.—Vigier<sup>50</sup> recommends the tincture of the root as a sovereign remedy against acute or chronic coryza. It also exerts an influence on the nervous system and on the heart. Smith<sup>89</sup> strongly advises it in inflammatory states of the testicle, epididymis and spermatic cord, saying that it removes the intense suffering and the swelling so promptly that it is unnecessary to use morphia. Brown<sup>3</sup> also uses it in orchitis, and calls attention to its well-known value in dysmenorrhœa, reporting a case where the medicine, given always 10 days before the expected period, gave relief after numerous other drugs had failed.

*Pyridin*.—De Renzi<sup>69</sup> finds this drug especially useful in angina pectoris and like conditions of oppression: dose, 6–10 drops daily, increasing to 25 drops well diluted with water. Asystole is more rapidly overcome by pyridin than by digitalis, and there is not, besides, the cumulative action of the latter. Yet it will certainly not replace the better known drug. Dandieri<sup>9</sup> has published a monograph on the use of pyridin and allied bases, in which he draws the following conclusions: (1) It is indicated in angina pectoris; where its action is prompt, and its use prevents fresh attacks; (2) in asthma, of whatever origin, inhalations of pyridin are to be preferred to injections of morphia, the effects being more lasting and unattended with danger; (3) in asthmatic attacks resulting from the inhalation of irritating gases, it is also an efficient agent; (4) in the dyspnoea of phthisis and laryngeal affections, its action is prompt. In these conclusions he supports

Sée, who uses a teaspoonful of pyridin on a plate in a small room in which the patient is placed. In urgent cases, 3–5 drops may be placed on a handkerchief and inhaled directly.

*Pyridine Tricarboxylic Acid*.—This crystalline substance, whose properties are described by Rademaker,<sup>88</sup> is preferred by him in malaria to quinine, 10 grains generally causing a cessation of the paroxysm without any cerebral disturbance, ringing in the ears, or derangement of stomach or bowels. 12 grains given in asthma—especially the spasmodic form—affords immediate relief, and prevents a return of the paroxysm if taken before the attack. In asthma from organic lesions it is inert. He has found it valuable in pertussis and now gives no other medicine internally in diphtheria. In not less than 150 cases of typhoid fever the drug reduced the temperature more effectually than either quinine or the cold bath. Hectic fever was modified in the same favorable way. Finally, it constitutes a valuable injection in gonorrhœa.

*Quebracho*.—Bourdeaux<sup>99</sup> has found the topical application of the alcoholic extract of quebracho diluted with water an energetic astringent and an aid to cicatrization. On fresh wounds with smooth edges it causes slight pain and stimulation, and induces healing by first intention. Its action is just as favorable in burns and frost-bites if the ulcers present a rosy aspect. In crushed and lacerated wounds healing takes place without the formation of pus after a few applications. It is a useful injection in endometritis and ulceration of the cervix uteri, used in the strength of a teaspoonful in a cupful of water. Internally, in doses of 20–30 drops, it is useful in asthenia and dysentery.

*Resorcin*.—Fliesburg<sup>21</sup> has for years used resorcin in cystitis, both locally and internally, and has found a 10–20 per cent. solution sometimes succeed in chronic cystitis when all other measures fail. But it is especially in the antifermentative treatment of cholera infantum that resorcin, in doses of .03 grams and upwards, has proved itself serviceable in his hands. A 5–20 spray used every 2–3 hours has cut short every attack of pertussis in which he has tried it, and sometimes aborted the disease in 2–3 days. A stronger solution may be similarly used in hay fever or summer cold. Perhaps resorcin, however, shows itself most useful in chronic indurated eczema in infants. Here a salve of equal parts of resorcin and oxide of zinc and 10 parts of cold cream will soon

bring about a change for the better. Callias<sup>100</sup> has made extensive use of the drug in diphtheria, using a spray of 5 in 100 for painting the pharynx or larynx, and a spray of 2 in 100 frequently during the day. He has also employed it as a spray in whooping cough and locally in erysipelas. It is also useful in chronic inflammations of the bladder and stomach. Andeer<sup>309</sup> considers it powerfully antiseptic, and useful externally in the diseases of the genito-urinary tract.

*Rhamus Purshianus*.—Brackut<sup>49</sup> advises the fluid extract in doses of 5–15 minims as a laxative, and 15–90 minims as a purgative. It is valuable in chronic constipation, and should for this purpose be given for months.

*Rhus Aromatica* (*Sweet Sumach*).—Unna,<sup>12</sup> after three years' experience, recommends the fluid extract of this plant in the nocturnal enuresis of children, for which it acts as a specific. The dose is 5 minims twice daily up to 2 years of age; 10 minims at the age of 2–6; and 15 minims for older children. It has also proved useful in hæmorrhage of the bladder, uterus and rectum.

*Saccharin*.—Jones<sup>19</sup> reviews our knowledge of saccharin. It is both antiseptic and sweetening, but it is in its latter character that it is of greatest use to us, as it passes through and is eliminated by the kidneys unchanged, and is therefore of the greatest value in all conditions where it is desired to avoid the use of sugar, as in diabetes, mellitus and obesity. It is also useful to disguise the taste of disagreeable drugs. Quinine, salicylic acid, cascara sagrada, nux vomica, etc., are all more or less concealed by it. It is especially serviceable in sweetening tea and coffee and gluten, biscuits for diabetic patients. Clemens<sup>44</sup> considers that it has great antiseptic power, excelling that of salicylic acid. It is harmless when given internally, but may, he believes, act on the salivary glands, and hinder the reduction of starches into glucose. He has used it with advantage in two cases of ammoniacal urine, and considers it superior to boric or salicylic acid in treating fermentative changes in the stomach and intestines.

*Salix*—*Salicin*—*Salicylic Acid*—*Salicylates*. — Hutchison<sup>13</sup> writes of *salix nigra* that he considers it a very powerful sedative, and employs it for women of a neurotic temperament whose nervous irritability reaches its height at the menstrual periods, at which time there is general malaise, decided ovarian pain, frequently

hemicrania (clavus), and sometimes pain under the left breast. If let alone these cases sometimes become hystero-epileptics. In doses of  $\frac{1}{2}$  drachm of the fluid extract 3 times a day, decided relief was obtained after 2-3 days in fully 75 per cent. of the cases treated. He also used it with benefit in two cases of nocturnal emissions.

*Salicylic Acid.*—Sullivan<sup>101</sup> writes in praise of the salicylate of ammonium in *febrile conditions*, considering it much less nauseating, depressing and irritating than the acid, or the salts of calcium or sodium. He regards it as a very effective antipyretic, and says that though it will not reduce the temperature as rapidly as antipyrine or antifebrine, the effect is more lasting. In septic conditions it exerts a curative action by retarding and possibly preventing the development of septic elements in the system. He believes, however, that it is depressing to the heart in large doses, and somewhat irritating to the kidneys. The dose employed was 8-10 grains every 2-4 hours during the first day, the amount being subsequently reduced. Fliesburg<sup>21</sup> believes that in the ammonium salt we have a sure agent in reducing temperature, and by its germicidal properties aborting and shortening the zymotic diseases. He always prepares it fresh, adding 1 part of the acid to 3 of carbonate of ammonia, and giving 15 grains every 1-2 hours to an adult. He has used it with great satisfaction in pneumonia, bronchitis, typhoid, croup, and especially in fevers of the puerperium. Vulpian<sup>13</sup> recommends the salicylate of lithia in acute articular rheumatism as more efficacious than the salt of soda. The dose employed was  $4\frac{1}{2}$ -5 grams daily. It was also serviceable in subacute cases, and to some extent in chronic rheumatism. As an antifermentative in diseases of the digestive apparatus, salicylate of sodium is recommended by Holt<sup>16</sup> in the summer-diarrhœa of children. He treated 81 cases with it and castor-oil, obtaining 84 per cent. cured and 7 per cent. improved. The dose given was 1-3 grains every 2 hours. Sullivan<sup>101</sup> found 3 cases of fermentative dyspepsia remarkably relieved by taking a dose of the salicylate of ammonium half an hour before meals. The *diuretic* action of salicylic acid is commented on by Huber.<sup>102</sup> 21 out of 25 cases of rheumatism exhibited an increase in the amount of urine immediately after taking the drug, this ceasing at once on its withdrawal. In 4 cases diuresis persisted even during the days when no salicylate was given. In another series of cases not of a

rheumatic nature, diuresis was augmented in the larger number; the average increase equalling more than a pint. In typhoid fever the effect was not so marked as in other diseases. In pleuritic effusion it lessened the fluid very considerably.

Burroughs<sup>17</sup> recommends salicylate of soda as an absolute specific in migraine, 20 grains repeated in  $\frac{1}{2}$  hour being sure to give complete relief within an hour.

*Salinaphthol*—*Naphthalol*—*Betol*.—There having been some accidents with salol on account of the phenol which it contains, Kobert<sup>15</sup> proposes the use of a compound of salicylic acid with the comparatively harmless naphthol. It is insoluble in water, without taste or unpleasant odor, and is, like salol, dissolved only by the intestinal secretions. Its action in doses of 3-5 grams 4 times a day is much the same as that of salol. Sahli<sup>84</sup> objects to its use because it contains less salicylic acid than salol does, and is less reliable; and quotes an instance where the urine of a child of 6 years of age failed to show any reaction for salicylic acid, even after 12 grams of it had been taken in 24 hours. Lepine,<sup>5</sup> too, raises the same objection against it.

One of the most elaborate papers concerning this drug is that by Georgi,<sup>20</sup> who has employed it in about 40 cases. He claims that although it contains both carbolic and salicylic acid, yet even in large doses it is free from the disagreeable action of either of these substances. It was tried locally in 2 cases of erysipelas without any effect. It forms an excellent antiseptic gargle in pharyngeal angina, in the strength of 4-5 parts in 100 of alcohol; 8-10 parts of this being added to 200 of water. This gargle is an efficient deodorizer of the breath in stomatitis, typhoid fever and other affections. In diphtheria it proved useful both internally and in the form of a mouth-wash. A case of severe mercurial stomatitis was cured in 7 days by the employment of the mouth-wash. The gargle and wash must be made freshly from the alcoholic solution, as the salol is precipitated and soon settles to the bottom of the glass. The offensive smell of a case of ozæna was quickly annihilated by insufflations of equal parts of salol and talc every 2 hours. The medicine seems to have no effect on the stomach, in sharp contrast with the nausea and vomiting which salicylic acid so often causes. No eructation, or loss of appetite was observed even after large doses. A case of febrile icterus

rapidly got well under the use of salol, which also reduced the temperature; while the tongue of a patient with typhoid fever quickly cleared, and the diarrhoea was greatly lessened. No antipyretic action was well seen in the hectic tuberculosis, while the patients bore the medicine well. The drug proved useful in some severe cases of cystitis, diminishing the amount of pus and relieving the tenesmus and pain, though the activity of the micro-organisms in the urine did not appear to be greatly interfered with. The author also suggests the use of salol as a deodorizer in gynecology. About 20 cases of articular rheumatism were treated with it, and none without more or less success. Muscular rheumatism is also relieved by it, but not so uniformly as in the articular variety. Relapse occurred in only 3 instances, and ringing in the ears in but 3. The author reports several cases of different febrile affections accompanied by tables and charts of temperature, showing the powerful action of the drug as an antipyretic. 2-3 grams of salol produces its maximum effect in 4-5 hours. The fall of temperature is accompanied by moderate perspiration. There is never any abnormal action of the pulse or respiration. Herrlich<sup>25</sup> has treated over 30 patients with different rheumatic affections successfully in the acute articular cases, but with only palliative results in the chronic and muscular forms. The salol cannot prevent relapse, and has but little influence on cardiac complications. The cases with the greatest fever are those most favorably acted upon by it. In atypical forms of articular rheumatism, salol, like all other anti-rheumatics, has but little effect. He further employed it in several other febrile affections with fairly certain antipyretic effects, noticing that the stronger the general condition of the patient, the better was the action of the medicine. There are some serious disadvantages connected with its employment, the most important of these being the disturbances of the stomach seen in weak typhoid patients. Most patients, however, bear it well. The author has seen 1 case of genuine carbolic acid poisoning follow the use of salol; and the shivering which usually attends the action of most modern antipyretics, is not always absent in the case of salol. Seifert<sup>45</sup> confirms Georgi's experience with the drug as a gargle or mouth-wash.

Guttman's<sup>27</sup> results with salol in the treatment of 17 cases of acute articular rheumatism and several of acute febrile diseases

have not been encouraging. In doses of 4 to 6 grams a day he finds the antipyretic action inconsiderable, and in no way superior to that of salicylic acid. It does not relieve the pain and swelling any better than the acid does, and in some cases not so well, and it does not prevent relapse. In some instances it produced ringing in the ears, and in others diarrhœa. Bielschowsky<sup>15</sup> has used salol in 27 cases of rheumatism with fever with complete cure in 19, and no result in 6, salicylic acid also failing to cure in these instances. 8 cases of relapse were observed. Average duration of the disease in the cases treated by salol was 4-8 days. He concludes that it is about as good as salicylic acid, but not superior to it, except that it is less apt to produce unpleasant secondary effects. 5 grams were usually given during 5 hours. Rosenberg<sup>15</sup> states that the pain and fever of acute articular rheumatism are completely abolished in 24-48 hours, but believes that relapse is exceedingly prone to occur. It is also powerless to prevent cardiac complications. He often saw the same unpleasant effects as after salicylic acid, though on the whole, sweating and disturbance of the digestion is less marked than after the latter drug. Schaufli<sup>34</sup> has given salol in 4 cases of rheumatism of different forms. In 1 of these it could not be tolerated by the stomach; in 1 it answered admirably, and in the other 2 it was of little benefit. Gram<sup>105</sup> reports favorable results with salol in acute articular rheumatism and in cystitis, while the remedy has been of no use in typhoid fever and diabetes mellitus. Lépine<sup>5</sup> objects to the use of salol in urgent cases, on account of the uncertainty of its being decomposed in the intestine. On the other hand, in mild cases or during convalescence it may be used with advantage, as even its prolonged use is without injury to the digestion. Behm<sup>97</sup> gave it in doses 6-8 grams per day. In acute articular rheumatism it is inferior to salicylic acid; for while the latter often gives relief in 24 hours, the former takes 3-4 days to produce the same result. In chronic rheumatism, on the other hand, it seems to be superior to the acid. Lombard<sup>106</sup> believes that though indicated in subacute articular rheumatism where the pain is the only important feature, it has not the specific character in relation to acute rheumatism which we recognize in salicylic acid. Feilchenfeld<sup>15</sup> considers salol in doses of 1-3 grams particularly useful in catarrh of the bladder and in pyelitis. His results were good, the urine becoming acid,

and suppuration being diminished. In some instances he was forced to stop its administration on account of frequent micturition. He also found the drug serviceable when dusted over sluggish ulcers. Tate<sup>103</sup> deems it a much more useful antiseptic than salicylic acid, and recommends it for surgical dressings. Goelet<sup>4</sup> finds that the summer diarrhoea and dysentery of children, and the intestinal disturbances in typhoid fever, may be very satisfactorily treated by salol; the dose being 10 grains every 2 hours for an adult, and  $\frac{1}{2}$  grain to an infant of 6 months. Between the age of 5 and 10 the dose should be 5 grains. Perrier and Patin<sup>104</sup> view salol as an efficient substitute for iodoform for surgical dressings, and report a case in which it proved itself superior to it. Thorner<sup>3</sup> found it useful in rheumatic inflammation of the throat and in follicular tonsilitis, and very valuable to relieve the pain in 3 instances of parenchymatous tonsilitis. In 3 cases of rheumatic torticollis the effect was very pronounced. Used locally in diseases of the mouth, he has failed to find salol superior to other means employed. Salol was further useful in relieving the pain in 4 out of 5 cases of diseases of the ear, 1 of these being a patient with chronic purulent otitis; while in several instances of painful affections of the eye, it acted in a truly marvelous manner.

The conclusions which may be most readily drawn from the varying experience of the different writers quoted seem to be that salol as a specific for rheumatism possesses no superiority over salicylic acid, if, indeed, it is equal to it; that relapses are perhaps more liable to follow its use; that it is, as a rule, less liable to disagree with the stomach and to produce other unpleasant symptoms; but that it is by no means free from these objections to the use of the acid.

*Sandbox Tree*.—Dr. Jos. Levi, our Corresponding Editor in the Virgin Islands, writes of the emetic and cathartic properties of the seeds of this tree. Quite accidentally he discovered that the prisoners of whose physical condition he had charge, were in the habit of eating some of them whenever they desired to escape from work or to have extra food, being able to induce habitual diarrhoea in this way as often as they pleased. Levi ate  $\frac{1}{2}$  a seed, and experienced slight nausea and purging. The taste is not particularly unpleasant. He thinks the seeds may prove of some value as a prompt emetic and cathartic.



*Scopoline*.—Dunn<sup>13</sup> has used this new mydriatic in place of atropine in the treatment of corneal ulcers, keratitis and iritis, and has found it superior to either atropine or eserine in some cases. In rheumatic iritis it reduces the pain and the injection. He employed a solution of the strength of 1 grain to the ounce, and has seen no irritation caused by it.

*Sodium*—*Sodium Benzoate*.—Ruault<sup>40</sup> recommends the use of benzoate of sodium in the coryza and tracheo-bronchitis following the ordinary “taking cold.” In a large number of cases the medicine dried up the excessive secretion in a few days. It is also beneficial in chronic coryza, acute erythematous angina and in congestive cough due to granular angina, but is of little value in laryngitis and bronchitis. The dose should be 4–8 grams per day for 6–12 days; but a longer continuance of its employment without interruption is liable to produce dyspeptic troubles.

*Sodium Chloride*.—Rabow<sup>84</sup> has successfully treated several cases of hemicrania with chloride of sodium, giving a teaspoonful, when possible, just as the attack was coming on.

*Sozoiodol*.—Lassar<sup>15</sup> has used this substance as an antiseptic and alterative application, using it in the form of a 5–10 per cent. ointment. It is a combination of iodine, sulphur and carbolic acid.

*Sparteine*.—Leo<sup>56</sup> found that in the healthy individual sparteine causes no increase of the secretion of urine, and does not affect the pulse or blood pressure. Regarding the latter point he differs from Sée. The usual dose given was 0.1 gram every 2 hours. He recommends it especially in heart disease, in the condition of disturbed compensation, and where it is desired to produce diuresis. Prior<sup>20</sup> publishes an exhaustive review of the subject, and concludes that it is capable, under certain circumstances, of producing diuresis in health. It is oftener useful when disturbances of compensation are due to valvular lesions than when there exists some disease of the heart muscle. He has seen no good effects follow its use in bronchial asthma. Sparteine is to be employed in those cases where digitalis has failed or cannot be used, or where a rapid action is desired. Gluzinski<sup>61</sup> found that sparteine slowed the heart and increased the blood pressure. It produces death by asphyxia. It is less powerful than digitalis, but much more rapid in its action; and may be used when delay is dangerous. It does not remove cardiac arrhythmia. Stossel<sup>28</sup> states the views of Sée,

and gives the result of his own experience with sparteine. Sée considers it superior to digitalis in arrhythmia due to weakness of the heart muscle. Stössel, on the other hand, thinks that it is inferior to it, and without effect when the heart muscle has undergone fatty degeneration. As a pure diuretic, too, it is without power. Langgaard<sup>15</sup> has found it useful in 18 cases of heart disease. Clarke<sup>80</sup> concludes that it can be used in hypertrophy where digitalis is contra-indicated. It is very evident that the actual and relative value of sparteine is by no means as yet fully understood, and that the drug should be subjected to further investigation.

*Strophanthus Hispidus*.—This drug, used by the natives of tropical Africa as an arrow poison, was first brought to the notice of the medical profession by Frasen, who reported, in Nov., 1885, the results of 15 years experimentation with it. He again<sup>13</sup> writes concerning it, urging the importance of having the preparations of uniform strength, and proposing that the tincture be made in the proportion of 1.20, and that only the seeds be employed. The dose should be 4–8 minims. Quinlan<sup>13</sup> in 9 cases, found it especially valuable as a cardiac tonic and strengthener in typhoid fever, when the first sound is enfeebled. Its action may be perceived in 15 minutes after the dose is taken. This is by far the best thing that strophanthus can do. In œdema of the legs from heart disease great assistance is given to the laboring heart. Budd<sup>35</sup> details 2 cases of heart disease illustrating the diuretic power of strophanthus after digitalis had failed. Aulde<sup>9</sup> reports 4 cases treated with the tincture of strophanthus with very satisfactory results. Philippi<sup>13</sup> found the drug to exercise a marked effect in certain instances and to fail in others. Pins<sup>84</sup> having used the tincture in 23 cases of valvular disease, fatty heart, arterio-sclerosis, and Bright's disease found that in all patients with disturbances of compensation doses of 5–10 drops three times a day removed arrhythmia, reduced the frequency of the pulse and made it fuller and stronger, relieved the dyspnœa and greatly increased the secretion of urine. In hydrops from other causes the drug had no effect. It has the property of raising the blood pressure without increasing the resistance by narrowing the blood-vessels. It is a certain remedy against dyspnœa and asthma due to affections of the circulatory apparatus and of the kidneys. The author thinks

that it surpasses all other heart tonics, including digitalis, and is a reliable diuretic.

Drasche<sup>107</sup> reports a number of cases of various cardiac lesions of pneumonia in which the action of the drug was very marked. He recommends a larger dose than do some other writers, though the maximum is stated to be 40–50 drops of the tincture per day. When the drug is pushed, the patients almost always complain of a burning in the stomach, with loss of appetite and sometimes vomiting. Its action is quicker than that of digitalis, but not so lasting. In some cases he has used strophanthin in place of the tincture. Zerner and Loew<sup>2</sup> have only seen the remedy fail when the degeneration of the heart muscles was very far advanced. They regard it as equal to digitalis. In 7 out of 11 cases of Bright's disease the results were also good.

Hutchinson<sup>17</sup> has been well satisfied with its diuretic action in a case of renal colic due to the passage of a calculus. Audhoui<sup>108</sup> regards the dose usually employed as too small, since he has administered a quantity equivalent to 40 drops of the tincture used by Fraser without any effect. Finally, Mays<sup>16</sup> reports 3 out of many cases of cardiac affections treated with strophanthine, giving doses of 1.96 to 1.48 grains every 3 hours. He considers that it has a most beneficial action on the heart, quieting an excited pulse, and giving rise to no cumulative action or digestive troubles.

*Strychnia*.—Dobronravoff<sup>35</sup> has treated a number of cases of acute and chronic alcoholism with hypodermic injections of strychnia, beginning with  $\frac{1}{100}$  grain and cautiously increasing to  $\frac{1}{30}$  or in 1 case to  $\frac{1}{15}$  grain twice a day. Quiet sleep was produced in this way in acute cases, and in chronic forms nausea, vomiting and loss of appetite rapidly disappeared.

*Sulphur*.—Hugo-Schulz<sup>25</sup> after prolonged trial concludes that sulphur may with advantage be used in chlorosis where iron is not producing good results; and after its administration has been some time, iron will then often prove more successful. Where, however, there is catarrh of the stomach complicating the chlorosis, sulphur is not well borne.

*Sulphuretted Hydrogen*.—The use of sulphuretted hydrogen in the treatment of phthisis has occupied the attention of the profession in all quarters during the past year. As it receives

full attention in the ANNUAL under the heading of *Treatment in Phthisis*, it is considered unnecessary to allude to it here.

*Tannin*.—As a result of his employment of it in 94 cases of different diseases, Duboué<sup>36</sup> concludes that in doses of .20 to 10–12 grams per day tannin acts serviceably and rapidly in several affections. In diseases of the serous membranes it frequently produces an abatement of the symptoms. This is especially true in chronic pleurisy and localized peritonitis. It is also useful in some disorders of the mucous membranes, as enteritis, bronchitis, and congestion of the lungs. It seems also to have proved efficient in certain cysts of the ovary. Prompted by his experiments on animals, Arthaud<sup>8</sup> has given tannin in over 50 cases of tuberculosis with excellent results. Improvement of the symptoms with an increase of weight was noticed at the end of a fortnight, and no relapse occurred.

*Terebene*.—Cammann<sup>109</sup> has employed terebene in 18 cases of bronchitis, emphysema and phthisis, and believes it to be especially beneficial in chronic cases in relieving dyspnœa. It is less irritating than turpentine. Owen<sup>13</sup> sent out a list of questions to various physicians regarding their experience with terebene. The conclusion from the replies of twenty-six is that it is a drug of considerable efficacy in shortening the course of chronic catarrhs of the upper air passages, though it is not a specific, nor always successful. It frequently gives relief in asthma, modifies the secretions of phthisis, and relieves flatulence. It is not apt to produce any untoward symptoms except disorder of the stomach. Its dose is 5–15 drops, given in mixture, as it does not dissolve in water.

*Terpine*.—Terpine (terpinehydrate) has been recommended instead of turpentine for many purposes. Morra<sup>110</sup> has found that it exerts no marked influence on pulse, temperature, or respiration, and is harmless in doses of 3 to 4 grams a day. He gives it in aqueous solution or as powder in cachets. In cases of chronic bronchitis the sputum was not at all diminished in amount, but was rendered more fluid and more easily expectorated, while in phthisis the effect was slight. The results in several cases of broncho-alveolitis of the apex were good, terpine lessening the amount of expectoration, and rendering it less tenacious. In one case of hæmoptysis the bleeding quickly stopped after its use. The remedy proved itself useful in diseases of the genito-urinary

system. Rabow's<sup>15</sup> results with terpine were favorable, and to substantiate them he reports the opinion of Lazarus and Hausmann. The former considers it a valuable expectorant, loosening the secretion and diminishing the irritation. The latter deems it an energetic modifier of the respiratory mucous membrane, though the effects have never been permanent. Patients are, however, able to continue the use of terpine longer than that of turpentine.

*Terpinol.*—Terpinol, another derivative of turpentine, is a colorless oily fluid, obtained by boiling terpine with mineral acids. Morra<sup>110</sup> has tried it in 2 cases of phthisis, and in an equal number of gangrene of the lung. It seemed to diminish the expectoration and lessen the odor.

*Thallin.*—Owing to the great attention given to antipyrine and antifebrine, thallin has been largely thrust into the background. We fully believe it, however, to be quite as safe as either of the others, and even more prompt in action, while it has certain advantages which they do not possess. Criticisms of thallin have been largely those of *hearsay*, coming almost altogether from those who have never or but seldom used the drug. Further, it seems to be a bare assertion that thallin has any injurious action on the blood. Those on the other hand who have made comparative studies of it and the two more popular antipyretics, have usually pronounced in its favor. Minot<sup>38</sup> employed antipyrine and thallin in 24 cases of typhoid fever, giving them only when the temperature rose above 102.5. The dose employed was 4 grains for an adult, though it was found that when given every 3–4 hours a much smaller amount was required to maintain the temperature at a moderate level after the first full dose had been administered. Both drugs acted promptly when given at or just before the end of the fastigium. Their general effect was good, and no worse results were seen than sweating and occasional vomiting. The favorable effects were especially noticeable in children, who bear the medicine remarkably well. Neither drug has any specific or decided effect on the issue or course of typhoid fever, and can only be looked upon as a palliative, contributing to the patient's comfort and perhaps indirectly promoting his safety. As regards the comparative value of the two drugs, Minot says that though the study of the temperature charts showed but little difference in their action, yet he believes that excessive sweating, prolonged

chill, and vomiting are more frequent after antipyrine than after thallin. Nothnagel<sup>111</sup> believes that antipyrine, antifebrine and thallin are, with few exceptions, prompt, safe and certain antipyretics. There are cases in which they have no action, and there are others in which they produce collapse and cyanosis. These effects are proportional to the rapidity and power with which the drug acts. Ehrlich<sup>27</sup> gave it in typhoid in frequently repeated doses,—the *continuous method*,—using that amount which was found to keep the temperature at a certain low elevation. In this way the patient was given the appearance of convalescence, while the splenic enlargement and the typhoid spots persisted. He admits that statistics show that the disease is in this way prolonged, but claims that this is fully compensated by the control over the temperature, and the euphory enjoyed by the patient. There were no instances of intestinal hæmorrhage or perforation under this method, and the kidneys were not affected; but œdematous swellings and hyperæmia appeared to be caused by the use of the drug.

Kohts<sup>15</sup> calls attention to the fact that Von Jaksch, Ewald, Ehrlich, Guttman, Sara Welt, Demuth, Oppler, Maragliano, Stegen and others have all spoken highly of the antipyretic action of thallin, Guttman being the only one who does not prefer it to antipyrine. The author treated cases of typhoid fever in children by the continuous method of “thallinization” of Ehrlich, giving 0.03–0.15 grams hourly during 12–20 days. The general effects were usually good, and sweats and chilliness were rare; but the process in the intestine and the swelling of the spleen were not affected. There were no collapse, nor apathetic and somnolent conditions, hallucinations and great unrest and sleeplessness, such as are at times seen in children after large doses of antipyrine. In some instances, however, after a continued employment of thallin the patients acquired an anæmic appearance, and convalescence was unnaturally prolonged. The author believes this to be due to a slow thallin poisoning, without detectable change in the organs. Personally the editors would carefully, but promptly and unhesitatingly, give thallin, antipyrine or antifebrine whenever hyperpyrexia seemed to demand it; but they are disposed to look with suspicion upon the “continuous” and often uncalled-for interference with the temperature-curve of typical typhoid fever, as being, in the case of all the antipyretics, probably not beneficial

if not, indeed, prejudicial to the course of the disease. Osler<sup>21</sup> relates a case of pneumonia in which antifebrine in doses of 8 grains failed six times to reduce the temperature, and where 4 grains of thallin twice brought it down 3° and 4° F., while the cold pack was still more effective. On the other hand, Hagens<sup>56</sup> reports several cases of typhoid in which thallin, given according to Ehrlich's continuous method, had no decided value. Anserow<sup>5</sup> does not like the drug as well as antifebrine. Kreiss and Goll<sup>85</sup> administered it internally in doses of 4 grains every 3 hours, with excellent results, in chronic cases of gonorrhœal cystitis. As an injection also of the strength of 2-2½ per cent. it caused rapid subsidence of the inflammation. Finally, we would not fail to call attention to the death frankly reported by Ehrlich,<sup>13</sup> which he believes to have been due to thallin, since post-mortem lesions were found similar to those seen in animals killed by toxic doses of the drug. It must be stated, however, that he gave the patient by the continuous method the enormous dose of *9 grains every hour*.

*Thymol*.—Martini<sup>112</sup> reports 19 cases of diarrhœa and dysentery of various sorts, all of which except the cases of chronic dysentery, were benefited in from 2-12 days. 20-120 grains were given to adults in the course of the 24 hours, and in only one instance were there any evidences of poisoning. Henry<sup>46</sup> has followed the suggestions of Martini, and administered thymol to a number of cases of intestinal disorders, including 10 patients with typhoid fever. He believes that the course of the latter disease was most favorably modified by the treatment. When contrasted with an equal number of cases treated without thymol, the good effect was noticed in the steady reduction of temperature, the diminution of the daily number of stools, the absence of mental excitement, and especially by the clean, moist tongue presented in nearly every instance. In several cases of intestinal catarrh the remedy also proved serviceable. Its employment is based upon its well-known antiseptic properties. He has always given it in pill form, two 2½-grain pills every 6 hours. He has also found it of some value as a tæniifuge. Meunier<sup>11</sup> has used a solution of thymol in liquid vaseline (1 in 100) for antiseptic hypodermic medication.

*Trimethyl-Carbinol*.—Schapirow<sup>12</sup> gave it over 200 times to persons suffering with different nervous diseases,—dose being 5-15 drops 2-3 times a day. The drug seems to be a useful sedative.

*Urethan*.—Longovoi<sup>13</sup> finds that urethan is well borne by patients, has not a disagreeable taste, and does not cause any gastric disturbance. Its chief influence is on the brain, and it does not seem to act on the peripheral nervous system. At all events, it has no effect when sleeplessness is due to cough or pain. It is not a powerful hypnotic, but in nervous insomnia and in sleeplessness in the acute fevers it is useful. Andrews<sup>86</sup> reports the action of urethan on himself, and on 18 cases of insanity of different sorts. The dose usually given was 30 grains. He concludes that urethan has marked hypnotic power, that the effects were felt in about an hour after its administration, and that sleep usually lasted through the night. The experience of the editors with urethan has been on the whole unsatisfactory. It sometimes induced sleep, and as often failed. This may be because we used it in too small a dose, though we adopted that prescribed by von Jaksch, who first employed it.

*Vaseline*.—The chief point of view from which vaseline has received attention during the year is that of an excipient for various substances intended to be administered by hypodermic injection. The oil of vaseline, which is used is obtained from the Russian petroleum and is known as *liquid vaseline*, is one of the last products of the distillation of petroleum,—coming over after paraffine, and being purified by filtration through animal charcoal. Ley<sup>24</sup> describes it as colorless, odorless, tasteless, and producing no pain or swelling when injected subcutaneously.

It has great solvent powers, dissolving readily the essential oils, iodine, bromine, sulphuretted hydrogen, iodol, iodoform, carbolic acid, sulphide of carbon, and a large number of the alkaloids. It is rapidly diffused under the skin, and seems to have the property of rendering innocuous substances dissolved in it which would otherwise prove too irritating for use in this way. The author found iodine thus given diminish the cough, lessen the expectoration, and relieve the oppression in emphysema, asthma, and bronchial catarrh. In chronic bronchitis and phthisis with little fever, eucalyptus acted well; but in more acute cases it caused too much excitement, and increased the fever. The results following the use of carbolic acid alone in vaseline or iodine combined with it and given hypodermically in phthisis, though slow, have been remarkable, even in unfavorable cases. Not only



did the symptoms improve, but the bacilli gradually disappeared. Of all the substances employed the author prefers iodine and carbolic acid; and next to these eucalyptol and sulphide of carbon. Meunier<sup>24</sup> has tried a very large number of the antiseptics in this way, as well as other substances, but insists on the necessity of having the vaseline and the drugs dissolved in it absolutely pure. Among the solutions recommended we find eucalyptol, 1 in 4; carbon bisulphide, 1 in 20; turpentine, 1 in 4; iodoform, 1 in 100; menthol, 1 in 9; thymol, 1 in 200; eugenol, 3 in 100; helenine, 1 in 100. He also speaks of the value of a 1 in 4 solution of chloroform to be used in sciatica and neuralgia, the injection being without pain. A 1 in 10 solution of salol may be used in the same disease. Dujardin-Beaumetz<sup>11</sup> has repeated Meunier's clinical experiments with solutions in vaseline. He has chiefly used eucalyptol, but has also employed iodine, iodoform, myrthol, sulphuretted hydrogen and bisulphide of carbon, and reports no injurious effects following their hypodermic injection, though he does not speak highly in their favor.

*Veratrum Viride*.—Squibb<sup>72</sup> recommends the use of the fluid extract as a powerful arterial sedative, in doses of 2 minims every 3 hours; or in urgent cases, 4–6 minims every hour until the pulse falls to 50–60 beats per minute. Even larger and more frequent doses may be employed when a very rapid action is required. It may be given hypodermically if not retained by the stomach. Ady<sup>8</sup> has been using it for thirty-four years, and says it has disappointed him fewer times than any other medicine. It slows the action of the heart, but has not, he believes, any tendency to weaken it. In all inflammatory disorders where the heart's action is too strong and frequent, it is superior to blood-letting. In typhoid fever it is one of the best of remedies, given in small doses. In puerperal convulsions it is most efficient, but must be ordered in very large amounts. 30–60 drops of the fluid extract may be given in a single dose, and seldom needs to be repeated. It is worse than useless in diphtheria, but is *the* remedy in croup, administered in very large doses. He has also found it valuable in small-pox, and by its use does not allow the pulse-beat to rise above 60 during the course of the disease. Stroud<sup>54</sup> praises veratrum viride in the treatment of pneumonia, and concludes from observations at the bedside that by holding the pulse between 65 and 70 the

drug saves a further invasion of the pulmonary area; prevents failure of the heart,—since 70 pulsations to the minute will not exhaust its power; and hinders purulent infiltration,—since this is the result of an overactive heart pumping more blood to the lungs than the veins can return. Experience teaches him also that it will not paralyze even a weak heart.

*Water (Hydrotherapy, Heat and Cold)—Mineral Waters.*—The subject of hydrotherapy has received considerable attention during the year. Winternitz<sup>58</sup> reviews this subject, on which he made his first communication more than 22 years ago. Through thermic or mechanical irritation of the periphery we may produce changes in the innervation not only of the peripheral nerve endings, but of the central nervous system. An anæsthetic area may be made sensible by the transitory action of heat or cold; a hyperæsthetic district may be reduced to the normal condition in the same way. Cold applied to the vertebral column will diminish the frequency of the pulse. It will also diminish pathologically increased reflexes, while heat seems to increase them. Thermic and mechanical irritation act directly on the muscles,—this being especially well seen in the muscles of the blood-vessels. Here heat or cold may either excite or depress.

Lydston<sup>7</sup> concludes as regards the *local* use of water, that, (1) acute sthenic inflammations will be likely to be benefited by either hot or cold applications. (2) Caution is necessary in the use of cold. (3) Warm or hot applications are usually productive of better results than cold. (4) With either agent the temperature should be kept as equable as possible. (5) In chronic inflammations and hyperplasia, heat and cold may be alternated with effect. (6) Cold applications should never be used when the tissues are in a condition of low vitality, as in erysipelas, gangrene, phagedæna, etc. (7) Where suppuration is to be prevented, moist heat is indicated. (8) Where the tissues become sodden, the moisture and not the heat is at fault. As regards its *general external* use, he says: (1) Hot and cold baths act by virtue of their effect on tissue protoplasm. (2) Heat exalts the nervous system, increases elimination, stimulates and secondarily depresses. Hence it is to be used in (*a*) nervous depression, (*b*) convulsive and spasmodic affections, (*c*) diathetic and cachectic conditions demanding elimination of effete material from the blood. (3) Cold in

robust subjects causes temporary, almost inappreciable depression, followed by a healthy reaction. In pyrexia the reaction does not take place so well, and cold is to be used with proper caution. The cold bath is to be given (*a*) in debility when not too pronounced, (*b*) in fever, its use here being more prolonged. Concerning the *internal* use of water, it cannot be taken in excess in any form without manifest perversion of the nutritive functions. In febrile conditions, however, the system demands water, which dilutes and removes the specific poison, and thus diminishes heat production, inhibits protoplasmic activity by saturation of the cells; cools the tissues, and restores fluid to them; stimulates elimination. Ziemssen<sup>113</sup> considers hydrotherapy the chief of antipyretic therapeutic measures for cooling the blood and its action on the different organs of the body. The value of the baths is not to be determined by the reduction of the temperature alone, but by the influence which they show upon the general appearance of the disease. Frey<sup>102</sup> has found the Turkish bath useful in reducing the amount of fat in obesity,—the precaution being taken, on account of the possible presence of a fatty heart, to omit the cold douche. The baths are also beneficial in aortic and mitral disease not due to atheroma. Where compensation is lost and anasarca, dyspnoea, and scanty secretion of urine is present, the pulse becomes less frequent, respiration easier and the arteries fuller. The cold douche should be avoided in the first bath: the patient becomes accustomed to it gradually in succeeding ones. In chronic Bright's disease with hypertrophy of the left heart, œdema of the legs, and in insufficient secretion of urine, the baths are beneficial, as well as in all conditions due to a weak state of the circulation.

Riess<sup>20</sup> mentions the value of permanent baths in disease and injury of the spine, and in cardiac and renal dropsy. The patient should be suspended in a hammock in the water, and the bath covered with a thick woolen cover in order to prevent, as much as possible, the loss of heat. He has tried this method with success in a large number of cases, the dropsy becoming very decidedly less within 48 hours. The secretion of urine is also augmented, but not proportionately, so that it would seem that the bath increases the functional activity of the skin. At the beginning of the treatment the patient should be removed from the bath at night; but in a short time he may remain in it constantly. The

author has also obtained good results with it in chronic rheumatism. Barr<sup>111</sup> relates the case of a patient with pyæmia, periostitis of the femur, and extensive bedsores whom he immersed for 17 weeks in water at a temperature of about 95° F. Recovery followed. A case of pyæmia treated during 4 months in a bath by Puzey greatly improved. Barr describes the tank-bed of Neil Arnott, in which a patient is to be deeply immersed in the water, but separated from it by thin india-rubber sheeting, and refers to several cases occurring in the practice of others where this apparatus was used with success. Kellogg<sup>4</sup> states that the Turkish bath has been used in mental diseases in times past, and he has himself reported 2200 applications of it in various forms of insanity. He has found it chiefly beneficial in all conditions of capillary stasis, and in certain cases of melancholia in which there is apparently complete suppression of the glandular function of the skin. There are apt to be cutaneous paræsthesia and tactile illusions in these cases, which the bath relieves by restoring the cutaneous activity. The Turkish bath is further useful in cases of toxic origin arising from plumbism, hydrargyrisim, alcoholism, etc.; and in syphilitic, gouty, rheumatic, and certain other diathetic insanities. The Russian bath is a strong nervous stimulant, and answers in the main the same indications as the Turkish bath. The Roman bath is a desirable modification of these, by inunctions practiced after the exposure to dry or moist heat. Regarding the employment of ordinary baths, the cold bath is to be given carefully, yet without hesitation in hyperpyrexia, in general paresis, following the status epilepticus, in puerperal mania, in typhomania, and in rare instances in acute delirious mania. Tepid baths [80–95°] are useful in relieving the perverted peripheral sensations from which many insane patients suffer. They should be tried to produce sleep, before resorting to powerful drugs. Prolonged warm baths have been often recommended for the treatment of cases of acute insanity. Cold applications should at the same time be made to the head. Hot baths [100°–105°] may be given in angio-paretic conditions with subnormal temperature. They are contra-indicated in organic spinal diseases. The graduated bath (reducing slowly from 98° to 60° or 40° F.) is the most prompt means of lowering the temperature in alcoholic mania, and in other conditions where indicated. The wet pack is valuable

.

in hysterical or hypochondriacal cases with extreme irritability of the cutaneous system. Hot as well as cold packs may be employed; or friction may be made through the wet sheet. The actual cold affusion is too severe a remedy except in certain cases of hyperpyrexia. Shower-baths are useful in conditions of stupor and in hysterical insanity; while the hot shower to the lower extremities may be given with advantage in the impaired circulation of simple dementia. Douches of various temperatures are frequently beneficial. The hot spinal douche is often valuable in stupor and mental depression, and in cases of insanity from sexual or alcoholic excesses. Hot foot-baths with or without mustard, or the full mustard bath, are useful in certain conditions, as in cerebral congestion. Where the general applications of water just described cannot be employed, we may substitute sponging, or ice- and hot-water bags. Finally, as to the use of salt water, frictions with a solution of bay salt constitute a good stimulant for feeble patients with dementia or melancholia. For those who are strong enough, warm brine baths are to be recommended; while surf bathing is an excellent means of procuring a lively reaction in robust patients.

Harris<sup>73</sup> describes his method of procuring moist heat with slacking lime and relates 2 cases—1 of suppressed menstruation and 1 of acute rheumatism—relieved promptly by this vapor bath. Liégeois and Greuell<sup>115</sup> report an interesting case of spinal irritation with severe pains in different parts of the body, and with attacks of migraine and of angina pectoris for a long time unimproved by any medication to which she had been subjected. She was then treated by sponging the body twice a day, together with the cold douche to the chest and the nape of the neck, with virtually complete cure in a short time. Holt<sup>16</sup> much prefers the continued use of the cold pack, in pneumonia, to the employment of quinine.

*Xylol*.—Xylol is recommended by Zuelzer as an antiseptic, and Otvos<sup>5</sup> found in 315 cases of severe small-pox that the troubles of respiration and of digestion rapidly decreased. The patients were able to take liquid food without difficulty, and the breathing grew less superficial. He believes the action is general and not local, and that the drug hastens the coagulation of the pustules and hinders their becoming confluent. The expired air smells strongly

of xylol, making attendance on the patients less disagreeable. He administers it in doses of 2-3 grams per day, in wine or mucilage.

*Zinc Cyanide*.—Lashkevitch<sup>13</sup> considers that the cyanide of zinc has a peculiarly beneficial action in cases of palpitation and pain in the cardiac region, whether due to organic or neurotic affection of the heart. In the latter case, however, the action is more marked. Where digitalis, convallaria and other heart tonics commonly prescribed seemed to irritate the abdominal viscera, cyanide of zinc has shown itself particularly valuable. The dose usually given was  $\frac{1}{10}$ — $\frac{1}{8}$  grain three times a day.

## REFERENCES.

1. Cent. f. d. Med. Wiss. 2. Wien. Med. Woch. 3. Cinn. Lancet-Clinic. 4. N. Y. Med. Jour. 5. La Semaine Méd. 6. Jour. of Dietetics. 7. Jour. Am. Med. Assoc. 8. Med. and Surg. Rep. 9. Am. Lancet. 10. Atlanta M. and S. Jour. 11. Gaz. des Hôpitaux. 12. Deut. Med. Zeit. 13. Brit. Med. Jour. 14. La Pratique Méd. 15. Therap. Monats. 16. Boston M. and S. Jour. 17. Provincial Med Jour. 18. Med. Bulletin. 19. Med. Press and Circular. 20. Berlin klin. Woch. 21. Therapeutie Gaz. 22. Gaz. Méd. de Strasbourg. 23. Revue Méd. d. l. Suisse Romande. 24. Bull. Gén. de Thérap. 25. Duct. Med. Woch. 26. Revue de Méd. 27. Münch. Med. Woch. 28. Cent. f. d. ges. Med. 29. Corr. Blatt. f. Schweiz. Aerz. 30. Indian Med. Gaz. 31. Pittsburgh Med. Rev. 32. Neurol. Cent. 33. Western Med. Rep. 34. Kansas City Med. Index. 35. Lancet. 36. Jour. de Méd. de Paris. 37. New Orleans M. and S. Jour. 38. Trans. Assoc. Am. Phys. 39. Jour. Am. Med. Assoc. 40. La France Méd. 41. l'Union Méd. 42. London Med. Rec. 43. Trans. Texas State Med. Assoc. 44. Allg. Med. Cent. Zeit. 45. Cent. f. klin. Med. 46. Med. News. 47. Phila. Med. Times. 48. Nouveaux Rem. 49. Med. Register. 50. Revue de Thérap. 51. La Praticien. 52. St. Louis M. and S. Jour. 53. Le Progrès Méd. 54. Daniel's Texas Med. Jour. 55. Gaz. degli Ospitali. 56. Zeit. f. Klin. Med. 57. Jour. de Méd. et Chir. 58. Wien. Med. Presse. 59. La Tribune Méd. 60. Med. Standard. 61. Vratsch. 62. Cent. f. Bact. u. Paras. 63. Cent. f. Gyn. 64. Phys. and Surg. 65. Canadian Pract. 66. Jour d'Hygiène. 67. Lyon. Méd. 68. Am. Jour. of Phar. 69. Revista Clin. 70. Practitioner. 71. Am. Med. Digest. 72. Ephemeris. 73. Chicago Med. Jour. and Exam. 74. Birmingham Med. Jour. 75. Jour. des Sci. Méd. de Lille. 76. Cent. f. d. ges. Ther. 77. Gaz. Méd. di Roma. 78. Pesther Med. Chir. Presse. 79. So. California Pract. 80. Am. Jour. Sci. 81. Chicago Med. Times. 82. Arch. de Neurol. 83. Tippecanoe Co. Med. Soc. 84. Fortsehr. der Med. 85. Cent. f. Chir. 86. Weekly Med. Review. 87. Paris Méd. 88. Miss. Valley Med. Monthly. 89. Am. Pract. and News. 90. Canada M. and S. Jour. 91. St. Petersburg Med. Woch. 92. Southern Med. Rec. 93. Gaz. Hebdom. 94. Jour. de Méd. Bordeaux. 95. Gaz. Méd. de l'Algérie. 96. Australasian Med. Gaz. 97. Zeit. f. Therap. 98. Gaz. Med. Italiana. 99. Arch. Méd. Belge. 100. Le Concours Méd. 101. Gaillard's Med. Jour. 102. Duct. Arch. f. klin. Med. 103. Pharm. Rec. 104. Revue de Chir. 105. Rep. of Dr. Levison, Corr. Ed. 106. Thèse de Paris. 107. Wien. M. Blätter. 108. La Thérap. Contem. 109. Coll. and Clin. Rec. 110. Gaz. Méd. du V. rino. 111. Allg. Wien. Med. Zeit. 112. An. Univ. di Med. e Chir. 113. Klin. Vorträge. 114. Liverpool Med. Chir. Jour. 115. Bull. Méd. des Vosges.

[Undated references apply to journals published in 1887, and original articles can be found by consulting the indexes of the respective publications.]

## EXPERIMENTAL THERAPEUTICS.

By HOBART AMORY HARE, M.D.,

PHILADELPHIA.

---

*Acetphenetidine*.—The introduction of acetanilide or antifebrine and the powerful properties which it was found to possess, induced Hirschberg and Kast<sup>1</sup> to busy themselves with the amido-phenols and their acetyl derivatives. The first compound tried experimentally was phenetidine acetate, or an ethylized amido-phenol containing the acetic radical acetphenetidine, which crystallizes in colorless or faintly reddish needles, is almost insoluble in water, and easily soluble in alcohol or dilute acetic acid. It is tasteless, and doses of three to five grams produce sleepiness, uncertain gait, vomiting, and at last cyanosis of the mucous membranes of the mouth. When doses of several grams were administered to animals, the blood became darkened in hue; but these writers state that this was not of necessity due to methæmoglobin; for the spectroscope did not always show its presence, and never showed any methæmoglobin after smaller doses. The drug does not apparently produce any lethal effects, unless in enormous amount. After ordinary amounts, the animals recovered in a few hours. When acetphenetidine is given to human beings suffering from pyretic conditions, the bodily temperature immediately begins to fall, gradually reaching its lowest point after about four hours. Sweating is very slight, and there may be signs of collapse or cyanosis even after the use of two or three half-gram doses. The pulse is almost unaltered, while the arterial pressure is somewhat increased. After large doses, three grams, the urine becomes strongly yellow, but not particularly dark. Chloride of barium shows the absence of sulphuric acid, copper oxide in alkaline solution is reduced by long boiling, while the urine rotates light to the left half a degree.

*Alcohol*.—The effects of alcohol on digestion have been studied by Gluzinski,<sup>2</sup> who gave the drug to fasting individuals,

and at various periods siphoned out the stomach. He has arrived at the following conclusions: That alcohol rapidly disappears from the stomach, leaving not a trace of its presence behind. The digestion, as influenced by alcohol, is divided into two phases in healthy individuals. The first is characterized by marked retardation of the digestion of proteids, which fail to be changed into peptones until alcohol is removed. The second stage begins after the escape of the alcohol, when the secretion of gastric juice is so plentiful that in the end the food is digested as soon or sooner than if alcohol had not been ingested. Gluzinski finds also that alcohol is an aid to digestion. Bodländer<sup>3</sup> noticed that alcohol causes a diminution of the amount of oxygen absorbed and carbonic acid eliminated; and concludes that, being itself burned up in the organism, it protects the tissues of the patient. It may take the place of those foods which add force to the system, not those which add nourishment; and it must not be forgotten that the drug does harm if used in cases where the ordinary ingestion and digestion of food is sufficient. The results of Forster, of Amsterdam, are also in accord with Bodländer and many others on this point, all believing that alcohol, in ordinary amounts, is burned up in the system.

*Antifebrine.*—This drug was first discovered by Gerhardt in 1845, but remained unknown to the medical profession as possessing any medicinal properties till 1886, when Calm and Hepp, Küssmaul's assistants at Strasburg, used it as a therapeutic agent. Lépine experimented with it during the same year, and in connection with Aubert<sup>4</sup> have made recent observations on the blood of dogs poisoned by this substance, in which they found that, after the lapse of three hours from the administration of the drug, more than half of the oxygen usually present was absent; that the blood-corpuscles were unaltered in form, but decreased in number. They did not prove, however, by any other form of experiment that the corpuscles were actually destroyed. Dujardin-Beaumetz<sup>5</sup> insists very strongly on the slight effect produced by the drug on healthy men and animals, as compared with those persons suffering from fever. In an article of later date, Lépine,<sup>6</sup> while reporting the favorable impression which the drug still produced in his hands, denied the statement of Krieger<sup>7</sup> that antifebrine has any antiseptic power. This last point regarding its effects we believe to be still *sub judice*.



As has already been said, antifebrine produces, when added to freshly drawn blood, or blood in the body, a peculiar change from the normal color to a brownish hue; and that this change is due to an alteration in the hæmoglobin has been proved, not only by the observers already quoted, but also by Weill,<sup>5</sup> Henocque,<sup>8</sup> Herczel,<sup>9</sup> Müller,<sup>10</sup> Bokai,<sup>10</sup> Evans,<sup>11</sup> and a numerous body of men working with the same end, unknown to one another, each and all of whom agree that not only is the ozonizing power of the blood decreased, but that the change noticed produces the well-known third spectroscopic band of methæmoglobin. The changes noted elsewhere in the blood are not by any means reported upon with the same degree of unity, since an almost equal number of investigators state that the drug decreases or does not affect the number of the red blood-corpuscles. Further than this, observers differ as to the influence exerted upon the shape of the corpuscles under such circumstances, some of them, notably Lépine and Aubert, claiming that, while the corpuscles are decreased in number, their form remains unchanged; while Herczel reports that the corpuscles no longer form rouleaux, but are granular, thinned, and non-adherent. He also affirms that while these changes take place, he has not been able to discover any numerical decrease. But while asserting that he finds no change in the number, he agrees with Lépine and Aubert that large amounts of free blood-coloring matter can be found in the serum, indicating, therefore, a breaking down of at least some of the corpuscular elements, and leading to the conclusion that some fallacy must underlie his observations regarding the number of the corpuscles. Henocque has also pointed out a very valuable diagnostic sign as showing that the antifebrine is being pushed to the border-line of danger, namely, that previous to the change of the color to methæmoglobin, with its accompanying cyanosis, the capillaries of the thumb first show congestion and discoloration previous to the involvement of the rest of the body. The degree of alteration taking place in the blood under the use of large doses of antifebrine is very considerable, and death may certainly be caused by this reduction. When we remember the statement of Henocque that 6.5 per cent. of the oxyhæmoglobin must be methæmoglobin before the third band in the spectroscope appears, it will be seen that great changes must necessarily take place, since even ordinary doses repeated day in and day out may

produce cyanosis. It will be remembered, too, that the reduction of oxyhæmoglobin in the veins is normally but about 5 per cent. of the whole mass of that present, and that, therefore, the arterial blood poisoned by antifebrine is less capable of carrying on vital processes than is ordinary venous blood as found in any of the great venous trunks. The same observer also found that the normal alkalinity of the blood was decreased. The urine became dark-brownish in color, and the addition of salt and acetic acid showed the presence of the blood crystals of Teichmann. Spectroscopic and chemical tests showed large amounts of biliary coloring matter, but only a minute quantity of sugar was present.

Proceeding still further, Herczel found that the symptoms of aniline and antifebrine poisoning are identical, save that with antifebrine the blood destruction is not so widespread. Experiments have shown that an aniline solution of .6 per cent. destroys the red blood-corpuscles, in dilution of 1 to 7000 or 8000 blood, leaving only the stroma; and in some tests he found that the tendency to cyanosis was in direct ratio with the anæmic condition of the patient when antifebrine was given, thus clinically establishing the fact that the smaller the amount of the blood the sooner changes take place in its characteristics. According to Herczel, however, the death occurring in animals from failure of respiration is due more to the impairment of the functions of the medulla by the changes produced in the blood supplied to it than to any direct influence of the drug itself on the nervous protoplasm; and as this belief seems founded not only on experiment, but sound reasoning, it may be accepted as true. Along with the perversion of function of the medulla, the reflex and other spinal movements are involved in the same manner. When antifebrine is given for several weeks at a time, in doses of thirty to forty grains a day to animals, a peculiar condition of cachexia is produced, resembling exactly that of aniline itself. The decomposition and dissolution of the coloring matter of the blood become very marked, and finally the animal dies, with the presence of spots resembling purpura hæmorrhagica, extravasations into the conjunctiva and eyelids, and all the signs of advanced and absolute breaking down of the tissues, particularly the blood. Paralysis of the extremities precedes this palsy of respiration, which, as already stated, is chiefly centric and due to the profound alterations in the circulating

fluid. Lang<sup>12</sup> records a simultaneous fall of pulse-rate with the temperature in patients under his care, the heart-pause being much prolonged. He compares its effects to those of small doses of digitalis, stating that it decreases the power of the heart by stimulating the vagus centre or the intercardiac inhibitory ganglion. He does not, however, adduce any experimental evidence in support of this belief. Solaro,<sup>13</sup> Dulacska,<sup>14</sup> and Matusovsky<sup>14</sup> also record clinical notes showing a simultaneous fall of pulse-rate with the temperature, but an increase in arterial pressure, agreeing with Faust,<sup>15</sup> who also found a rise of pressure along with the decrease in rate. Weill<sup>5</sup> also reached similar conclusions. Clinical reports generally are so in accord with these results that there can be no doubt of their correctness.

The only researches so far published as to the action of antifebrine on blood-pressure, and its relations to temperature, both in the normal and fevered animal, are those of Evans<sup>11</sup> and the editor,<sup>11</sup> the first of whom found a slight rise of pressure rather than a fall, while the second obtained a slight irregular fall of pressure with the fall of temperature. Both observers failed to note any marked change in pulse-rate, any change which occurred being a slight slowing. Evans used two rabbits; the editor, five dogs. In view of the fact that clinicians generally agree in stating that there is an increased vascular tension in fever during its use, and from the results of these experiments, it would seem that the drug certainly does not act by depressing the vaso-motor system, as do some of the older antipyretic remedies. The fall of arterial pressure occurring in the normal animal under the influence of antifebrine was so irregular that it possesses no particular significance, and may have been due to the decrease in the bodily heat rather than the direct effect of the drug. The pulse-rate is certainly very slightly affected, any change being a slowing rather than an increase in pulse-beats; but it is very certain that the influence of the drug on the circulation in the ordinary medicinal dose is scarcely noteworthy, save that the effect seems to be stimulant rather than depressant.

On the temperature of the *normal* animal, both Evans<sup>11</sup> and the editor<sup>11</sup> have found this drug to produce a fall. Evans, using several rabbits in the calorimeter, found a fall and studied its causes. The editor gave the drug hypodermically to ten rabbits, free to run

about; by the jugular vein to five dogs, attached to the mercurial manometer; and by the same channel to five other dogs in the calorimeter, studying the action of the drug in the same manner as Evans. In every instance the normal bodily temperature fell a degree or more. As a result of experiments on over twenty rabbits and dogs by these observers, we may conclude that the drug is capable of reducing normal temperature. In a series of very carefully conducted experiments made by Pasternatzky<sup>16</sup> on 50 patients with typhoid fever or pneumonia, the following conclusions were reached:—

During the first hour of observation, about five or ten minutes after the ingestion of the drug, there is a decrease of the rectal, axillary, and aural temperatures, while almost at the same moment the cutaneous temperature begins to rise. The rise of cutaneous temperature lasts until it reaches a certain point and nears the internal temperature, which by its constant fall tends to meet the external one. At the same time that the cutaneous temperature rises, the skin gives off an increased amount of heat, and this loss of heat is generally in direct proportion to the cutaneous temperature. In other words, the higher the temperature is the greater the loss becomes; but the maximal rise precedes the maximal loss. The occurrence of profuse perspiration does not come on with the maximal rise, but with the maximal loss. During the second hour of observation the temperature of the parts mentioned continue to fall as before, but more rapidly, the cutaneous temperature now falling, while the loss of heat by the skin constantly decreases. Pasternatzky also concludes that this drug decreases heat-production by decreasing nitrogenous metamorphosis; and he is supported in this belief by Bokai,<sup>10</sup> who also believes that heat-production is decreased after very large doses by palsy of the motor nerve ending in the muscles, thereby causing decreased heat-production in them; and that the drug lowers temperature by increasing the cutaneous dissipation of the heat, and also by its interference with the ozonizing power of the red blood-corpuscles. This belief of Bokai that heat-production is decreased by lack of muscle-change is, even if correct, only true after enormous doses. That the fall of temperature is also due to an increased heat dissipation by means of the sweat, is probably true; but that the drug does not act solely in this way has been

proved by direct experiment, not only with the calorimeter and non-sweating animals, as the dog, for example, but also by the use of a hypodermic injection of atropine, whereby the sweating was prevented, yet the temperature fell. The belief that the alterations in the character of the blood, whereby its ozonizing power is decreased, is a factor in the decrease of heat-production, as advocated chiefly by Bokai, is, to say the least, absolutely devoid of any basis, save one founded on theory. This becomes the more evident when we remember that the reduction of hæmaglobin produced by one or two ordinary doses of antifebrine is so slight as to be infinitesimal; and no more proof exists that this slight decrease (!) in ozonizing power is the cause of a decrease in temperature than exists that quinine does the same thing. The reduction of hæmaglobin probably only affects temperature when the dose is enormous and sufficient to produce cyanosis.

The only experiments made by the use of the calorimeter as to the method by which this drug reduces temperature have been performed in America by Evans<sup>11</sup> and the editor,<sup>11</sup> both of whom, working in different laboratories and unknown to each other, pursued lines of work running perfectly parallel, and reached results which are virtually identical. The apparatus used by both was to all intents and purposes also alike, and the method of calculation that employed by Dr. H. C. Wood in his well-known monograph on fever. In nine experiments with the normal animal, Evans found that there was an increase in heat-dissipation in seven cases, with decrease in dissipation in the remaining two; while in five cases heat-production was decreased, and in four it was increased. In one of these four cases the increase was very slight, although in another it was very much over any one of the changes seen in those cases where production was increased. In the experiments made by the editor on five normal animals, he found in four of the five a decrease in production and an increased dissipation. In the remaining instance dissipation was not affected, but production increased. Some fallacy probably lies at the bottom of this experiment. On the normal animal, therefore, these investigators found that antifebrine in ordinary doses, corresponding to those clinically employed, reduces bodily heat by decreasing heat-production and increasing heat-dissipation. In the experiments made by Evans on the *fevered* animals, the pyretic condition was

produced by the use of the so-called deutero-albumose; in those of the editor by the use of small quantities of the liquid obtained by making a watery solution of pepsine and filtering it. These substances were then placed in the blood-current and produced fever of from 1 to 4 or 5° Fahr., in the course of about one-half hour. In six experiments performed in this way, Evans found, without one exception, a decrease in dissipation and production; and as the decrease in dissipation was less than the decrease in production, it would seem probable that the latter function is more affected than the former, and that dissipation follows production. In view of the fact that the results reached by these investigators are so closely related, it may be considered proven that antifebrine decreases bodily temperature chiefly by a decrease in heat-production and an increase in heat-dissipation, both normally and in pyrexia, and is therefore a good antipyretic, preventing the burning up of the tissues during fevers.

Curiously enough the action of antifebrine on the nervous system seems to have almost entirely escaped the hands of the experimenter in the laboratory. So far as we are aware, the use of the drug in painful affections depends almost entirely on empiricism. Herczel<sup>9</sup> found that a large dose (15 grains) of the drug given hypodermically to rabbits, produced in a few minutes failure of reflex movements in the hind legs. Tremors began in the next half hour, and in the course of from thirty minutes to one hour these became convulsive in character, extending over the entire body. Following this stage was one in which all the reflexes were totally abolished, the last one to fail being the corneal reflex. When as much as 12 grains for each two and a half pounds of weight were given, reflexes were totally lost in five or ten minutes, motion failed, and in the course of from one hour to ninety minutes coma, with widespread palsy followed by death, appeared. The only investigator who has apparently made any direct nerve experiments is Bokai,<sup>10</sup> who states that in large quantities the drug paralyzes the motor nerve-endings in the muscles in the frog in much the same manner as does curare; and that after a large dose in rabbits, in the course of one or two hours, stimulating the muscles directly with the faradic current produces a fairly strong contraction; but that the same stimulation applied to the motor nerves produces very feeble response, which

even a very strong current fails to increase; and that at the moment of death, while active movements take place on direct faradization, no results whatever are reached by stimulating the nerve. From these experiments of Bokai it is therefore evident that antifebrine in toxic doses certainly depresses and paralyzes the peripheral motor nerves, while the influence on the spinal cord is still to be discovered. From the fact that antifebrine acts as powerfully in some cases in relieving pain, according chiefly to French observers, it is evident that the drug must also affect to a great extent the sensory side of the nervous apparatus; but whether this action is centric or peripheral, can not at present be stated. In the experiments of Evans and the editor it was noted that the animals became very quiet and passive, and that reflex action was decreased, while in some instances very evident motor failure asserted itself.

The only knowledge of the action of antifebrine on the nervous system that we possess is that it paralyzes, in toxic amounts, the peripheral motor nerves, first producing convulsions; and that it probably acts as a nervous sedative to the sensory nervous system, both peripheral and centric. Further investigations are certainly needed before its practical use in pain can be said to rest on a scientific basis.

Lépine,<sup>4</sup> Solaro,<sup>13</sup> Bokai,<sup>10</sup> Pasternatsky,<sup>16</sup> Cahn and Hepp,<sup>17</sup> and Lang<sup>12</sup> all report on the condition of urinary secretion under the use of antifebrine. The first of these investigators found an augmentation in the excretion of urea, and indeed in the excretion of all the nitrogenous constituents of the urine, and it is evident that his research was marked by great care. On the other hand, Pasternatsky quotes several writers to prove that the urea is decreased very greatly, and Bokai also seems to incline to this opinion. Lang is somewhat uncertain as to its effect on this portion of the organism. The same difference of opinion seems to exist as to the quantity of the urine itself. Thus Weill<sup>5</sup> reports that it is generally diminished, sometimes unchanged, but never increased; while Cahn and Hepp notice a decided increase in its amount, with a decrease in specific gravity. According to Solaro, Lépine states that the drug decreases the quantity. Faust also states that in certain cases where thirst was marked during the freedom from fever, there was a marked increase in diuresis.

The whole matter is therefore in a state of great uncertainty; and although the discovery, by the calorimetrical experiments, that heat-production is decreased, would naturally lead us to expect a decrease in the urea, the experiments of Lépine are so carefully performed that for the present we must bend to the conclusion that the elimination of urea is increased by the use of antifebrine rather than decreased. That antifebrine is destroyed entirely in the body has been proved beyond all doubt,—every observer insisting on the correctness of this belief; but as yet no one has discovered the form in which it is eventually eliminated.

Summary.—(1) Antifebrine, if used constantly or in large amounts, produces cyanosis and dyspnoea, particularly in febrile patients, the discoloration first appearing in the base of the thumb-nail. (2) It changes a certain amount of the oxyhaemoglobin into methaemoglobin when used in large amounts. (3) It has little effect on the circulation, and certainly does not directly depress it. (4) It reduces both normal and abnormal bodily heat by decreasing heat-production and increasing heat-dissipation. (5) Its influence on bodily heat probably depends on its action on heat-centres rather than on any effect of the blood itself. (6) It paralyzes in large doses the peripheral motor nerves, and depresses in ordinary doses the receptive portion of the nervous system. (7) Under its influence the elimination of urea is probably increased, although this point needs confirmation, while the urine is decreased in amount. (8) The drug is destroyed in the body.

According to Krieger,<sup>6</sup> antifebrine possesses quite marked antiseptic power; but Lépine<sup>7</sup> and several others so vehemently contradicted this statement that its effects in this line, if present at all, must be very slight.

Tests for Purity.—Antifebrine is so easily prepared by the addition of acetic acid in excess to aniline that it is hardly likely to be willfully adulterated. Yvon<sup>18</sup> has found that the following test answers well, however: it should be white or scarcely rose-tinted, should form a colorless liquid when heated on platinum foil, and should completely volatilize. To detect antifebrine in the urine the latter is shaken with chloroform, and the residue left on evaporation is heated with mercurous nitrate, when an intense green color develops.



*Antipyrine.*—The use of antipyrine as a sedative to the nervous system has caused a limited amount of research as to effects on the spinal cord and nerves. Germain Sée and Chouppe<sup>6</sup> have both reported attempts made by them to discover if antipyrine had any antagonistic action to strychnine in its effects on the spinal cord, and found that the drug acted powerfully in this manner. Chouppe found that if two grains of antipyrine be given hypodermically to a dog convulsed with strychnine to the point of death, the breathing became once more regular and natural. Gley, Wood,<sup>11</sup> Reichert,<sup>11</sup> and the editor<sup>11</sup> have noted that large doses of the drug produce spinal convulsions closely resembling in character those of strychnine. As has been pointed out by Laborde<sup>11</sup> in regard to antipyrine, and by every experimenter in regard to other drugs, small doses of drugs which tetanize or convulse often act as anticonvulsants. According to later researches of Chouppe, the convulsions of antipyrine differ greatly from those of strychnine in that they are much less tetanic, are not excited by external causes, and effect much less the respiratory muscles. He believes strychnine and antipyrine to be antagonistic when small doses of the latter are used.

While reports as to the influence of antipyrine still continue to appear now and again in the journals, no additional investigations, with one exception, have added to our knowledge as to the method in which the drug decreases bodily temperature, either normal or abnormal. The results reached by Martin,<sup>11</sup> of Easton, Pa., from six calorimetrical studies show that antipyrine acts by increasing the dissipation and decreasing heat-production. As these results agree entirely with those of previous investigators, they are probably correct.

*Atropine and its Derivatives.*—Probably no drug before the profession for the past fifty years has called forth so much original research as atropine, and the year 1887 has certainly proved no exception to its predecessors, save that, if any thing, it has brought forth more.

Binz<sup>10</sup> published the results of investigations made by him to discover what degree of exciting power atropine possesses, particularly on respiration with regard to morphia poisoning. In the detail of five experiments given by him, we find that atropine does all its supporters have claimed for it under such circumstances;

and for this reason Binz very strongly combats the conclusions reached by Lenhartz,—that atropine does harm rather than good after toxic doses of morphia. The tests of Lenhartz were clinical, almost without exception; and Professor Binz makes the point that Lenhartz's unfavorable results were due to an improper use of the drug, both as regards the small size of the dose and the condition of the patient at the time. One can readily understand how atropine in the third stage of opium poisoning, if used in fairly large doses, might increase the disorder. Notwithstanding the assertions of Lenhartz, and in view of the results of Binz, supported by an enormous amount of experimental research and clinical experience, we must therefore still regard atropine, if used properly, as one of our most useful drugs in combating opium narcosis. The error of Lenhartz, and of all others whose results have been unfavorable to the use of atropine, doubtless lies in the fact that they have made the mistake of regarding the physiological antagonism of the two drugs in the light of chemical antagonism, which latter occurs at all times and in all places; whereas the value of using physiological antagonists lies in their use just at the point where they meet for the time face to face, and not when they have passed each other and gone on to the point where both drugs, unrestrained by opposing each other, work their will on the body of the patient.

The action of atropine and its congeners, homatropine, hyoscyne, hyoseyamine, and daturine, on the heart of the dog, terrapin, and frog have been carefully studied by Beyer,<sup>10</sup> who used the isolated heart method devised by Newell Martin, of Baltimore. From his experiments he believes that at no time is the peripheral inhibitory apparatus depressed, but rather stimulated; that in the second, rapid stage, the stimulation of the accelerators merely exceeds the vagal stimulus and overcomes it; but that finally the inhibitory apparatus once more exerts its power and stops the heart in diastole, not from muscular weakness, but inhibitory stimulation. While Dr. Beyer's argument to support this view is a very ingenious one, there are certain features which must overthrow his theory, chief and foremost of which is that almost without exception every investigator has found that atropine is a direct depressing poison to the heart-muscle in large amounts. Beyer asserts that galvanization of the heart stopped by large doses of atropine causes the muscles

to respond; but this is opposed to general experience. Again, it is a well-established physiological fact that the accelerators and vagus nerves cannot be considered purely antagonistic, and that slight electrical stimulation of the pneumogastric can always overcome powerful electrical stimulation of the accelerators. So that it is hard to imagine how a drug which would first stimulate the vagi would then pass on and stimulate the accelerators so enormously as to overcome its first effects, and finally, deserting the accelerators, return to the vagi, and by its second action here stop the heart. Logically, this is unlikely; experimentally, it is without precedent.

Another element of fallacy comes forward when we remember that in Beyer's experiments the dogs were under the influence of large amounts of morphine and curare, and that this first drug stimulates the peripheral pneumogastriacs, so that the ever-constant irritation noted by this observer may have been due to the morphine and not the atropine. It is curious likewise that when studying atropine, its physiological antagonist, opium, should be used to prevent pain. The influence of atropine on the thermogenetic apparatus has recently been carefully considered by Ott and Collmar.<sup>11</sup> Starting out with the belief that the thermogenetic centres are chiefly, if not entirely, in the spinal cord, these experimenters, by careful experimentation, both with and without the calorimeter, found that the rise of temperature following the use of atropine is caused by increased heat-production and dissipation,—production being the function chiefly affected. Their experiments are so thorough that no ground for doubting the truth of them can be discovered, and they only need the confirmation given by other researches of like character.

*Borax and Boracic Acid.*—Interesting experiments have been carried on by Johnson,<sup>20</sup> of Stockholm, who introduced these two substances into the stomachs of patients in the Caroline clinic, giving as much as twenty to fifty grains daily in irregular doses. After large amounts had been taken, three cases exhibited signs of intoxication, with headache, vomiting, and relaxation. In other cases a well-marked erythema developed itself upon the thighs and joints. The rapidity with which the drug was eliminated was carefully noted, and it was found that borax could be recovered from the urine in ten minutes after its ingestion. When given by inunction it could not be found even after two days' use. When

taken for several days in the doses named, its presence could be detected in the urine for eight or ten, and in one experiment for fourteen, days after the drug was withheld. In all cases it was found to have a diuretic effect, and where albuminuria existed the percentage of albumin was very much decreased or entirely put aside. Borax was also found to be eliminated in the perspiration, saliva, and feces, and was twice found in serous effusion. Rather contradictory to the statement that the drug is not rapidly absorbed by inunction is the assertion made by this author that after foot-baths containing boracic acid, borax may be found in the urine. The experiments of Johnson were performed for the purpose of demonstrating that the custom of washing out cavities with 5 per cent. solutions of this drug was a dangerous one, and that it should not be used in a larger proportion than 2 per cent., and that even then neutral carbonates should be injected after its use in order to neutralize its effects.

*Caffein, Theobromin, and Xanthin*.—Paschkis and Pal,<sup>21</sup> working in the laboratory of Professor Striker, have studied the effects of these three substances upon the muscles. Their method of experimentation consisted in protecting one limb by a ligature and injecting the drug into the trunk. After a certain time they laid bare equally the gastrocnemius muscle in each leg, fastening both to the kymograph. They found that the irritability of the muscle of the frog is very much augmented by small doses of caffen, xanthin, and theobromin, but disappears entirely after a short time. The loss of irritability is chiefly produced by caffen, while the action of xanthin is resisted longer than that of the other two substances.

*Calomet*.—Zarvadzky<sup>15</sup> has found that calomet may prevent the decomposition of bile in the duodenum, and asserts that the typical calomet stools are due to the change of bilirubin into biliverdine, owing to the presence of corrosive sublimate, into which he believes calomet is at least in part changed. It has been found, however, by other observers that the mere presence of calomet in a beaker containing bile will prevent the change of the bile-salts commonly seen in every-day life; and these same writers believe the changes usually occurring to be due to the presence of microbes, which are prevented from forming by the presence of the calomet. Whatever may be the true explanation

of the matter, the green stools of calomel-purging can no longer be thought to be due solely to an action on the hepatic cells.

*Cannabis Indica*.—The physiological action of this drug has been studied by the editor,<sup>11</sup> who found that ten minims of a pure fluid extract given by the jugular vein to a twenty-pound dog produced in two or three minutes a condition of happiness, during which the animal gamboled about the room in a playful manner. Following this the dog passed into a second stage, during which the equilibrium was partly lost; for the animal, sitting on its haunches, placed its forefeet wide apart to keep from falling. In the course of ten minutes this condition was replaced by apparent recovery of balancing power, the dog running about frolicking and barking. No change occurred for twenty or thirty minutes, when the animal vomited, the swaying and staggering reasserted themselves, now affecting all the legs; incoördination was replaced by drowsiness deepening into heavy sleep, from which it was difficult to arouse the dog, although the reflexes were markedly accentuated, particularly as to sounds. The sleep lasted for many hours, and the dog apparently recovered completely when he awakened. In some instances the lack of coördination is evidently due to failure of sensation, for the animal places his feet on the floor as if it were uneven, or higher than it is. That the drug may be given in enormous doses by the jugular vein without producing death is proved by the fact that as much as from ten to twenty-two cubic centimetres of the fluid extract, which was found to be active in doses of eight minims in man, produced deep sleep without any marked change in arterial pressure or pulse-rate, the slight changes occurring being due to direct cardiac depression, and not to stimulation of the inhibitory apparatus. Any fall of arterial pressure would seem to be due to failure of cardiac power.

The editor found that as much as thirty-two cubic centimetres were required to produce death, which came on under such a dose very rapidly. The drug has therefore very little lethal power. Respiration continues after the heart ceases to beat, if the drug be sent *en masse* into that viscus. If given otherwise, there is a simultaneous failure of heart power and respiration. On the nervous system, both in the dog and frog, we have a stage of heightened reflex action, which is replaced by reflex palsy due to an action on the sensory side of the cord and nerve-trunks, and

not on the motor tract or nerves. The chief influence is of course exercised on the cerebrum.

*Carbolic Acid*.—The editor<sup>11</sup> has studied this subject in a series of thirty experiments. Ten of these were made upon the rectal temperature of the rabbit free to run about; five on the normal rectal temperature of a dog whose carotid arteries were attached to the manometer, but whose temperature was normal; five upon fevered animals used in the same way; and ten dogs in the calorimeter, five with and five without fever. As a result of these observations he concludes that carbolic acid possesses considerable power in lowering normal bodily temperature, and that it possesses more power over pyretic temperature than salicylic acid, generally preventing a rise or causing a fall, but that it is not as powerful as other antipyretics of the coal-tar group. He also believes that it decreases the arterial pressure when lowering temperature, and that when decreasing normal bodily heat it probably acts both on heat-production and heat-dissipation. In fever it affects both functions, but chiefly decreases heat-production.

*Cimicifuga Racemosa*.—Hutchinson<sup>11</sup> has experimented upon the rabbit, dog and frog, and found that when as much as ninety minims of the officinal fluid extract were given hypodermically to a rabbit weighing two and a half pounds, the animal after fifteen or twenty minutes became quiet and manifested a disposition to sit in one place, and when laid on its back on the palms of the hands did not struggle, but remained passive and quiet. There was, however, no motor paralysis, since the animal could readily move about when it so desired. Respirations were somewhat slowed, and the pupils slightly dilated. When the drug was given to the frog in as large a dose as thirty minims, it produced motor palsy in a very few moments, the batrachian lying passively on its back with its limbs extended and perfectly relaxed, and becoming at the same time excessively cyanotic. It was proved, by the ordinary methods of studying the action of the drug upon the nervous system, that cimicifuga is a direct sedative and paralyzant to the spinal cord of the frog only in large doses, exerting its influence chiefly on the receptive centres or the afferent nervous apparatus, and perhaps affecting slightly the motor nerves. Hutchinson also found that when the frog's heart is thrown directly into some of the fluid extract it suffers diastolic arrest after a few contractions;

but when removed in a moment or two from the solution is able to begin its movements once more, on irritation. The same state of affairs was observed when the heart-muscle was bathed in the drug, lying in its pericardial sac. On the dog and rabbit Hutchinson found that the drug lowered arterial pressure by direct action on the heart itself, when given in large doses, by paralyzing the vaso-motor centres in the base of the brain. Respiration was considerably slowed by large doses. The rhythm became altered, and if the dose was very large, respiration usually ceased before the heart.

*Cocaine.*—Now that the first rush of excitement as to the local anæsthetic influence of cocaine has passed away, investigators are endeavoring on all sides to increase our knowledge of the action of the drug on other parts of the organism besides the peripheral sensory nerves.

Mosso,<sup>37</sup> of Turin, noted that large doses paralyzed the spinal cord, while the peripheral sensory and motor nerves retained their function. As the cord was palsied, reflex action was of course rapidly destroyed. In the advanced stages of the poisoning it was noted that the irritability of the motor nerves was increased. Different animals of the same species differed greatly as to their power of resisting the toxic influences of the drug; and he also found that the convulsions arising from the drug were not due to increased reflex irritability, since they were not produced by external irritation. Further than this, he believes, as the result of his experiments, that these convulsions (which do not occur in cold-blooded animals) were due to the disturbance of nutrition, and that this same element of excitement extended even to the muscles. Death was sometimes ushered in by violent tetanic spasms; at other times the animal passed into coma and death by ever-deepening paralysis. That the convulsions were spinal in their origin was proved by cutting the spinal cord high up, when the drug produced tetanic contractions apparently as well as before.

The possibility of the onset of convulsions or palsy is also verified by the researches of Feinberg,<sup>17</sup> who has in addition noted the occurrence of epileptiform convulsions, evidently due to an effect on the cerebral cortex. Feinberg also notes a difference between the effects of cocaine when applied to the nerve-trunks of dogs and rabbits, stating that in dogs reflexes are abolished by this

means, while in rabbits they are increased. This curious condition of affairs has probably some fallacy underlying it, such as the reaching of the cord in the dog by the poison, whereby the spinal centres are depressed, as already proven by Mosso. That cocaine has a special affinity for the sensory and terminal sensory fibres of the cortex cerebri, and that it eventually inhibits the functions of this area, Feinberg believes to be proved; while he asserts very positively that the convulsions noted by nearly all observers are due to anæmia of the cortex from vaso-motor spasm. In support of this belief, he brings forward the fact that nitrate of amyl banishes the convulsions, as does also bromide of potash. This can hardly be considered as positive proof, however, since nitrate of amyl acts equally on the protoplasm of the nerve-cells as on the vaso-motor system. Durdafi,<sup>10</sup> along with Feinberg, have shown that when cocaine is introduced into the circulation it produces exophthalmos, dilatation of the pupils, and retraction of the eyelids; and Durdafi believes these effects to be the result of stimulation of the sympathetic centres in the spinal cord. According to Mosso, Durdafi, and many other observers, cocaine, when given in fairly large doses, increases the rapidity and force of the circulation with a rise of arterial pressure, the increase in rate, according to Mosso, not being due to palsy of the pneumogastric; for galvanization of these nerves, even after very large doses of cocaine, showed the pulse as greatly as under ordinary circumstances. There is, however, for a very short period after the use of the drug a temporary depression of the vagi of slight degree. Even enormous doses do not slow the heart. The rapid pulse of cocaine must therefore be due to a direct stimulation of the heart itself or of the acceleratory apparatus. The results reached by Durdafi point to the latter belief; but this cannot be considered by any means as proven. A considerable difference of opinion also exists as to the manner in which the heart is stopped by cocaine,—that is, in systole or diastole. The weight of evidence is in favor of the former. The cause of the rise of arterial pressure produced by small or very large doses of cocaine would certainly seem to be increased cardiac action and a direct influence on the blood-vessel walls. Whether the higher vaso-motor centres are affected remains to be determined.

According to Mosso, cocaine introduced into the veins produces a primary lessening in the number of respirations, followed by a



persistent and characteristic increase in the movements of respiration. Large doses produce paralysis, sometimes of the thorax and sometimes of the diaphragm, which would appear to be due to a direct action on these parts; for larger doses still are required to stop breathing completely, or in other words to palsy the respiratory centre. Mosso has also demonstrated that of all known drugs cocaine is the most rapid and powerful increaser of bodily temperature which is not put aside by previous section of the spinal cord. The drug must therefore directly increase the oxidation of the tissues without any influence of nerve-centres other than those in the cord itself. Mosso also found that cocaine and chloral are strongly antagonistic; and that while the former cannot raise the temperature in chloral poisoning, it can restore consciousness and motion. As both drugs paralyze respiration, they must be used against each other with care. One-eighth of a grain of cocaine to each pound of bodily weight, and about seven grains of chloral to each pound, is the proportionate antagonism.

*Copper*.—Curci<sup>13</sup> finds that in the frog, copper causes palsy of the central cortex in the motor areas, and also depresses very greatly and paralyzes the circulatory apparatus. In the dog, he believes it to act first on the receptive centres in the spinal cord, causing failure of reflex action, then upon the perceptive centres in the brain, and finally on the motor tract of the spinal cord and cerebrum. As a consequence voluntary movement persists even after the foot fails to be drawn away from a flame. Copper acts on the circulation in a stimulatory manner on the intracardiac accelerator apparatus and also on the vaso-motor system, producing as a result of such action an increase in arterial pressure. This stage is, however, followed by a depression of these functions. When toxic doses are used, death occurs from failure of respiration, aided by pulmonary oedema, resulting from a weakened right ventricle. On the nervous system, Curci believes copper to be a direct poison, the circulatory symptoms, while due to a direct action on this portion of the organism, being less marked than the nervous. When injected into the veins, Curci asserts that copper is incapable of producing emesis.

*Cysticus Laburnum*.—This drug has been shown by experiment to act upon the nerves precisely as does curare.

Prevost and Binet,<sup>22</sup> to whom we owe most of our information

concerning cysticus laburnum, find that in small doses the aqueous extract of the drug acts chiefly as an emetic, causing vomiting in those warm-blooded animals that can vomit, with great rapidity and violence; and that this action is due to an influence on the centre in the medulla,—five centigrams (five-sixths of a grain) being all that is necessary to act in six minutes in this way if given hypodermically; while if given by the mouth vomiting only occurs in fifteen to twenty minutes. No diarrhœa is associated with this effect of the drug, and no other systemic symptoms assert themselves. If the dose be increased, great weakness and lassitude, with prostration, occur, evidently due to the depression of the motor nerve endings; and if a lethal dose be given, death comes from failure of respiration, apparently due to palsy of the nerve endings rather than to any action on the respiratory centre. Notwithstanding the fact that Prevost and Binet state that the drug acts upon the heart of the frog, paralyzing it, they assert that it exercises no effect upon the circulation of the mammalia; but if their statements as regards the heart of the batrachian are true, they must certainly be in error on this point; and we can find no experiment detailed to support this view. When lethal doses are given the heart is found relaxed and flabby, and all the abdominal blood-vessels and organs are intensely engorged. These observers recommend its use as a promptly-acting centric emetic, particularly if given hypodermically.

*Grindelia Robusta*.—According to Dobroklowski, the chief effect of moderate doses of the fluid extract on the heart and circulation is to diminish the number of cardiac contractions and to raise the arterial pressure. The decrease in rate is due in warm-blooded animals to stimulation of the inhibitory nervous apparatus of the heart, and especially the vagal centre in the medulla oblongata. The elevation of blood-pressure is due to contraction of the blood-vessels, partly to an action on the vessel-wall and partly to an action on the vaso-motor centres of the spinal cord, medulla, and cerebrum. It lessens the irritability of the accelerator nerves and also the motor nerve-trunks and muscles. The therapeutic value of the drug depends on its regulating the cardiac contractions, but its diuretic effect is slight. Its regulating power over the nerves of the heart is greater than digitalis, adonis vernalis, convallaria majalis; and its dirotic action is less than

digitalis and adonis. This last statement, if correct, shows the drug to be a valuable medicinal agent.

*Helleboris Viridis*.—Ischistowitch<sup>1</sup> has studied the effects of this drug upon the heart and circulatory system, using a watery extract. He finds that when less than one cubic centimetre of a 1 per cent. watery extract is given to the frog subcutaneously it produces a decrease in the pulse-rate, with an increase in the pulse-force. If a larger dose be used the heart goes through a peculiar vermicular or peristaltic movement, and the quantity of blood expelled at each systole is decreased. This condition continues, the heart becoming slower and slower, and finally being arrested in a strong systolic contraction. Previous to the final ventricular systole, the observer noted that for every ventricular contraction there were two auricular closures. On warm-blooded animals, represented by dogs, Ischistowitch found that from one to one and one-half cubic centimetres of the fluid extract per kilogramme of the weight of an animal caused a slowing of the pulse and an increase in the force of the individual heart-beat. Along with this increase of force is an increase in arterial pressure, which is still further augmented later on by an increase in pulse-rate. Some time after this the heart becomes irregular and intermittent in its action, and finally stops. That the primary slowing of the pulse is due to vagal stimulation seems proven by the fact that section of the pneumogastric or palsy of that nerve by atropine puts it aside. The rise of arterial pressure is due to an increased heart-action, associated with a direct action on the peripheral nerve-endings or muscles in the wall of the blood-vessels; and it has also been proved that the peripheral, as well as the central vasomotor system remains intact after death from the drug. In cases of heart-disease without compensation this drug, in doses of ten to twenty drops of a 1 per cent. watery extract, seemed to be of value in six cases out of eleven. In two cases no results were apparent; while in the remaining three negative results were obtained,—one of them having a cardiac malformation and the other two nephritis.

*Hydrobromate of Homatropine*.—This drug has been used for several years, as is well known to the profession, as a rapidly acting and fugacious mydriatic. But a few experiments, comparatively speaking, have been made with it in past years, while in 1887, Beyer,<sup>23</sup> of Washington, and de Schweinitz and the editor<sup>24</sup>

have studied its effects from an experimental stand-point. The latter observers have substantiated the statements heretofore made, namely,—that the paralysis of accommodation comes *pari passu* with the action on the pupil; or, in other words, that dilatation of the pupil and paralysis of accommodation end together. The drug produces slight smarting when applied, in many cases, and in rare instances some conjunctival irritation. Another advantage pointed out is the rarity of toxic symptoms after its use, as with atropine and duboisine,—the only signs noted by any one being slight drowsiness in rare cases. The fact that in nearly all cases where the drug is used in the eye, a marked slowing of the pulse comes on in a short time, was the stimulus which led de Schweinitz and the editor to make their studies, while Beyer studied the drug merely as a member of the mydriatic group. It was found by the two experimenters working together that when three-fourths of a grain of homatropine is given hypodermically to the frog, a peculiar change in the respiratory rhythm takes place, the breathing assuming a form closely allied to that known as the Cheyne-Stokes. This is followed by a marked decrease in the number and depth of the respirations, so that in a few minutes respiration ceases. Voluntary movement and sensation are well preserved, and continue so for nearly forty minutes, when tetanic spasms of a mild type appear, occurring independently of external irritation. The stage of spasm is very short, and paralysis soon asserts itself. It was proved by the ordinary measures that this palsy is due to an action on the spinal cord, and not to any effect on the motor nerve-trunks or muscles. The sensory nerves were also unaffected even when the drug was placed directly upon them. These results are in accord with those of Tweedy and Ringer,<sup>25</sup> who found that after a palsy of from seven to eight hours the frogs again suffered from tetanic spasms previous to the return to voluntary movement. The drug is therefore in many ways a mild atropine.

Beyer used the isolated heart and vaso-motor system devised by Martin, while the two other Americans used curarized dogs, otherwise perfectly intact, attached to the mercurial manometer. According to Beyer, homatropine increases cardiac movements by stimulation of the accelerator apparatus in small doses, while large ones slow the heart by stimulating the inhibitory apparatus. He

states, however, without any qualification, that the drug acts on the heart-muscle itself as a strong excitant, and as this is opposed to the evidence of all other investigators, it must at least be doubted.

*Hyoscine*.—This drug, chiefly brought forward by Wood,<sup>26</sup> who also studied its physiological effects, has recently been studied in an equally thorough manner by other observers,—at the bedside as well as physiologically. The more important points arrived at by these investigators agree with those of Wood, save that Kobert and Sohrt<sup>27</sup> did not find any decrease in reflex irritability, as seen by Wood. The latter believes it to possess little influence on the vagus nerve, while Kobert believes that it paralyzes that part of the cardiac apparatus. The respiration is unaffected, according to Kobert; but depressed, according to Wood. Kobert believes it to act on the heart in the same manner as atropine by removing the influence of the vagus, and that it is eliminated unchanged in the urine. Sohrt<sup>14</sup> found that the mydriasis produced by hyoscine did not affect accommodation, using the  $\frac{1}{146}$  of a grain; but Gley and Roudeau,<sup>28</sup> Crousseau and Remy insist that paralysis of accommodation is complete. It has also been proved by Kobert, Sohrt and others that hyoscine is antagonized by muscarine all through the organism in the same manner as is atropia.

*Iodoform*.—When a drug is as widely used for antiseptic purposes as is iodoform, it becomes of the greatest importance to know whether this use is based purely upon custom or upon real, practical common sense. During the past year many writers have endeavored to discover the exact value of the drug; but, unfortunately, they do not all reach identical conclusions, although they are sufficiently similar to prevent as general a use of the drug in the future as in the past. Heyn and Rovsing,<sup>29</sup> after a most prolonged course of experimentation, declared iodoform not only useless in the treatment of wounds, but even dangerous. These conclusions were arrived at after employing the substance against germs developed by the ordinary bacteriological measures. De Ruyter<sup>30</sup> also made a like series of tests, and agrees with Heyn and Rovsing, that iodoform does not act as a germicide outside of the body, where it is not decomposed; but that if nutrition surfaces and wounds are protected by the drug, germs falling on them will do no harm.

Associating with him Dr. Behring, De Ruyter pushed his

researches still farther, and found that iodoform is decomposed by pus, which is kept at blood-heat outside the body, while sterilized blood or blood-serum does not affect it. Just as soon as microbes are allowed to enter the fluid, the iodoform begins to be broken up. De Ruyter also believes that the iodine resulting from the breaking up of the iodoform unites with the ptomaines present, and while by so doing it does not directly kill the germs, it influences their growth unfavorably; but, on the other hand, he has found that pure solutions of iodine do not unite with the ptomaines in the same manner as does the iodine resulting from iodoform. Further than this, he has found that a saturated alcoholic solution of iodoform is especially useful for rapid disinfection, as of wounds or dressings. Baumgarten and Kunze,<sup>17</sup> who repeated the investigations of the Danish workers, reached conclusions identical with those of their predecessors, save that in their opinion iodoform mixed with culture fluids delays infection for some time. They point out the startling possibility that iodoform itself may contain germs, and should therefore be disinfected before being used by soluble antiseptics. On the other hand, Sanger,<sup>10</sup> who has studied the influence of the drug on the bacilli of anthrax, finds that while iodoform does not prevent their growth and consequent effects, it may to some extent influence them favorably (from our stand-point) by diminishing their virulence and infective power. Bruns<sup>30</sup> also reaches conclusions allied to those of Sanger, except that he believes the drug to affect very favorably tubercle bacilli, in particular decreasing their number and altering the floor of tuberculous cavities so that granulations might spring up. Contrary to this, Rovsing has performed a series of tests, in which, after kneading a tuberculous mass in iodoform, he injected it into the anterior chamber of the eye of a rabbit with the result both of a local and systemic infection. Indeed, it appeared that if one eye received an iodoformized tuberculous injection, while the other received only the pure tuberculous matter, the former eye became diseased first. The researches of Lubbert<sup>21</sup> also show that iodoform possesses but little power over germs. Its use would therefore seem to be founded on a fallacious idea of its powers, and its employment cannot be considered truly antiseptic, but merely better than nothing at all.

*Iodide of Potash.*—Samoiloff,<sup>15</sup> working in the laboratory of

Anrep, at Kharkov, has recently published the results of a study undertaken with a view of discovering the true influence of iodide of potash, as regards nitrogenous metamorphosis. He gives the following results from his experiments made upon the dog:—

Having first brought the animal to a condition of what he calls “nitrogenous equipoise,” its bodily weight was found to be 18,700 grams. During the first six days, when no iodide was given, the quantity of nitrogen eliminated by the animal with the urine and feces was 1.573 grams less than that given with the food. During the second period of six days, when the dog was taking two grams of iodide of potash daily, the quantity of nitrogen eliminated was 11.889 grams less than that introduced. During the third and fourth periods of six days the difference in lessening was 17.176 and 8.946 grams respectively. In other words, during eighteen days the animal’s weight had increased 900 grams, and 38.011 grams of nitrogen were retained. When, during the fifth period of six days, the animal was given as much as eight grams of the iodide daily, the amount of nitrogen eliminated exceeded by 10.603 the amount ingested. From these results Samoiloff believes that small doses of potassium iodide retard nitrogenous metamorphosis, but that large ones increase it.

*Methylal.*—Richardson,<sup>32</sup> Mairet and Combemale,<sup>11</sup> Personali,<sup>33</sup> Anrep and Motroclin,<sup>16</sup> and Popoff,<sup>16</sup> all agree that the hypnotic powers of this drug are of value. It is soluble in water, alcohol, ethereal, and fixed oils, is colorless, and has an odor similar to chloroform and acetic ether. Mairet and Combemale found that the administration of three to seven grains for every two pounds of bodily weight produced slight salivation and almost invariably quiet sleep within an hour, but if given hypodermically produced pain, and finally ulceration. The sleep lasted six hours, and if the dose were increased, it became most profound. When this dose is doubled, the poisoning appears in two stages. In the first we have palsy and somnolence, the disorder of motion being particularly marked in the posterior extremities, but gradually extending over the entire body. These symptoms are succeeded by general convulsions, which, in turn, are followed by a falling of the bodily temperature, while the pulse is rapid and a slight dyspnoea asserts itself. The second stage now comes on, in which profound sleep and relaxation tread closely on the heels of the convulsions, and

this lasts for several hours, the animal waking up greatly depressed. When lethal doses are used, the post-mortem examination shows congestion of the brain and spinal cord, with intense pulmonary and renal congestion. If given by inhalation, it is capable of causing unconsciousness, but produces great irritation of the respiratory passages.

Personali and Anrep and Motrokhin have found that the irritability of the cerebral cortex is much lessened. The drug has apparently little influence on the circulation, although experiments with it so far have been very crude. It lowers arterial pressure and pulse-rate somewhat, evidently owing to its action on the heart itself. Popoff, however, is positive that the belief of the other observers that the drug affects this portion of the organism but slightly, is dangerous and fallacious; since, according to his researches, it greatly slows the pulse by a direct depressant action on the heart-muscle and its ganglia. He also believes it to be a powerful respiratory depressant centrally.

*Quinine.*—Investigations as to the influence which this drug possesses over contractile tissue as occurring in the blood-vessel walls and elsewhere have been carried on by Wild,<sup>34</sup> who finds that in small doses it stimulates the increased height of contraction of voluntary muscle, and the initial contraction of the vessels. In larger doses, or after longer action of small doses, it completely paralyzes the contractile tissue: this is seen in the arrest of the amœboid movements, the cessation of response to stimuli in voluntary muscle, the stopping of the heart in diastole and the dilatation of the vessels. In very large doses, or after very prolonged action quinine causes contractile tissue to pass into a state of *rigor mortis*, as shown by the small spherical condition of the leucocytes, the rigidity of the voluntary muscle, the contracted state of the heart, the secondary contraction of the vessels after long exposure to the poison, and the contracted state of the œsophagus.

The conclusion that quinine in any dose acts on the heart as a stimulant is certainly opposed to all previous experimentation; and, further than this, it is not supported by Wild's own statement that it has been fully proven that quinine stops the heart in diastole. Small doses are said to increase the vigor of the contractions.



*Remisia Ferruginea*.—According to Pinet and Duprat,<sup>35</sup> the aqueous or hydro-alcoholic extract of this drug produces in the frog hyperexcitability, with an increase in respiratory movement and pulse-rate, while at the same time the ventricular systole is exceedingly powerful. After large doses are given convulsions come on, proved to be cerebral by section of the cord, when they ceased. Since extirpation of the cerebrum failed also to put aside the convulsion, it is supposed that they arise in the medulla. The muscles are unaffected. This drug is used medicinally in Brazil. Its effects on animal life higher than the frog have yet to be studied.

*Salicylic Acid*.—Experiments made by the editor<sup>11</sup> as to the effect of salicylic acid on bodily temperature, both normal and abnormal, have recently been published, in which, by some thirty experiments, he determined that (1) salicylic acid has the power to reduce slightly normal bodily heat; (2) salicylic acid, according to the writer's experiments, has but little power over pyretic temperature; (3) salicylic acid, when acting on either normal or abnormal temperature, does not seem to have much influence on the circulation, either in regard to pulse-rate or arterial pressure. Any change, when it occurs, seems to be an increase of arterial pressure rather than a decrease, and this increase occurred more markedly in the normal than in the pyretic animal; (4) salicylic acid, in reducing normal temperature, probably acts on both functions, namely, production and dissipation, while it seems to act very uncertainly and irregularly when reducing high temperature, failing frequently, as before stated, to prevent an increase of bodily heat.

*Spigelia*; or, *Pink Root*.—The physiological action of this drug, used so frequently as a vermifuge, has during the past year been studied by the editor,<sup>24</sup> who found that when as much as three ounces of the fluid extract of spigelia is given by the stomach to a large dog weighing forty pounds, the following symptoms appear. Almost immediately after the ingestion of the dose the animal has short and quick expiratory movements, amounting almost to a cough. Soon after the pupils become widely dilated, and at the same time very marked internal strabismus asserts itself, the eyes becoming fixed in this position so that they cannot follow any object, such as a pencil, when it is passed from side to side. Constant retching with no result now comes on, the animal

standing, and apparently suffering from no sensory or motor palsy. There is no change in gait. Soon after this, marked exophthalmia develops itself. The retching, having lasted about five minutes, now passes off, and at this time signs of muscular weakness and lack of coördination appear; the walk becomes staggering in both fore and hind legs. The respirations now become very rapid, resembling those of a dog after a long, hot run. The tongue hangs from the mouth and is dry and red, and the nose is hot and no longer moist. Muscular power is progressively lost, so that the dog frequently falls when endeavoring to walk, but sensation does not seem to be affected. About this period the animal lies down and passes into deep sleep, which in turn soon changes into coma, and death follows without any movement being made, evidently from a general failure of vital force. The respirations, as death approaches, become slow, and are finally extinguished consensaneously with cardiac arrest. He also found that the palsy was spinal in origin, the motor and sensory nerve-trunks and the muscles escaping.

The action of the drug on the circulation is as marked as its effects on the nervous system, and on the cardiac muscle it acts as a direct depressant poison; for if it be injected into the jugular vein in such a way as to come suddenly in direct contact with the heart the movements of that viscus almost instantly cease. When the carotid of a dog is attached to the manometer, and a drachm or less of the fluid extract injected, it is seen that the action of the heart is very rapidly slowed in its movement; and that this slowing is chiefly due to central inhibitory stimulation, is shown by the fact that if the vagi be cut before the drug is given, this slowing does not occur; and also if after the drug has slowed the heart, the vagi be cut, the inhibition no longer remains. That the fall of arterial pressure produced by this drug is due in great part to the cardiac depression which it produces is proved, since asphyxia will cause a rise in the pressure, and that the pressure returns nearly to normal as soon as the heart gets rid of the drug which has been suddenly injected into it. On the respiratory centre the drug seems to have a still more depressing influence, respiration ceasing some moments before the cardiac arrest. It was also found that the drug acted in the same manner on the heart and circulation of the frog.

*Strophanthus Hispidus*.—Within the last year the only

physiological experiments of any great value which we have seen are those of Bahadhurji,<sup>34</sup> carried on in Berlin under Langgaard. He found, as did Fraser, that large doses stop the heart in systole with an ever-decreasing diastole, so that while the systolic contraction resembles that of digitalis, the peculiar gaping diastole of that drug never appears. Therapeutic doses slow the heart-beats one half, and the ventricles, under these circumstances, open well. Cutting the vagi puts aside the slowing of the rate. Curiously enough his experiments show no appreciable rise of arterial pressure, and this result is so opposed to the results of Fraser and others as to cause hesitation in accepting it as correct. Diuresis in healthy man and animals is not much increased. Bahadhurji has also found that the drug powerfully affects the nervous system, producing first an increase of reflex action, then a failure of it. Muscular contractility is also diminished, and his experiments indicate that the drug depresses the spinal cord.

*Tangena Venenifera*.—This drug, known more generally as the ordeal bean of Madagascar, has been studied by Quinquaud.<sup>18</sup> When applied to the frog, voluntary motion is rapidly lost, although at first reflex irritability is somewhat increased, and convulsions, either tonic or clonic, assert themselves. Finally paralysis sets in and the frog dies, relaxed and flabby, as after curare.

In the dog, as representing the mammalia, Quinquaud found that vomiting, diarrhœa, and tenesmus frequently precede the convulsions. Muscular power remains at the normal point until death approaches. The respirations, at first quickened, become slow, while the pulse-rate also undergoes like changes, but respiration ceases before the heart. The same investigator has found that clinically the drug is useful in doses of one to one and one-half grains in palsies, particularly of the intestines, and also in tremors. He has used it, too, in urinary incontinence with good results. Headache, vomiting or depression show that the physiological effects of the drug are marked, and the dose should be stopped.

*The Oil of Turpentine*.—The physiological action of the oil of turpentine has been studied by the editor,<sup>24</sup> who gives the following summary of his experiments: The oil of turpentine, in small doses, produces an increased number of cardiac beats, due to a direct stimulating action upon the heart; the slowing occurring in large doses is due to stimulation of the inhibitory centre. On

the lower animal, as represented by the frog, small doses increase reflex action, large doses decrease it, the increase being due to a stimulation of the spinal cord, and the decrease to depression of the receptive side of the cord and afferent nerves.

*Ulexine*.—Experiments by Rose-Bradford,<sup>36</sup> of England, and Pinet,<sup>37</sup> with the hydrobromate of ulexine show that on the frog, in large amount, the drug arrests all voluntary movements and reflexes, and that this state of the animal depends upon palsy of the motor tract of the spinal cord and motor nerve trunks. The muscles themselves gradually fail; but unless the amount is very large they are not paralyzed. It is asserted by Rose-Bradford that respiration is arrested by doses which are not large enough to greatly affect voluntary movement. The symptoms of this respiratory action come on with irregular breathing; and, finally becoming more shallow, they sink into death. When given to one of the higher animals, it produces a rise of arterial pressure, which lasts only for a short time, being followed by a fall; and that the depressant action of the drug is its most important feature is shown by the fact that if larger doses are used, no primary rise, but a steady fall, occurs. This fall is evidently due largely to a laming of the heart-muscle by the direct action of the drug. According to Rose-Bradford, the diuretic effect of ulexine is very marked, being as great as that of caffeine. As it acts so violently on respiration it can hardly be found of value in medicine.

*Ustilago Maydis*.—This drug, belonging to the group of Ustilagineæ, or smuts, of a natural order of fungi, has been used considerably for several years as an oxytoxic. According to Dorland,<sup>24</sup> and indeed to most writers on the subject, corn-smut produces a different uterine contraction from that of ergot; for while the latter contraction is tonic, the former is clonic in character. In other words, corn-smut contractions resemble those of quinine. The effect on the uterus after ingestion of the drug varies somewhat; but it may be considered that when taken by the stomach, it will be absorbed and produce its effect in about twenty-five minutes. If on further use this drug carries out the results so far obtained, it must certainly supplant quinine in the second stage of labor, since it acts directly upon the uterine muscular fibre, while quinine only increases the contractions by stimulating the general system. The dose of ustilago is one-half

to two drachms of the fluid extract. Its influence is much less than that of ergot, and from reports so far published it would seem to be possessed of very slight toxic properties, unless given in enormous amount.

*Veratrum Viride.*—Notwithstanding the fact that this drug has been considerably studied in previous years, several investigators have continued their observations upon it during the past twelve months. Chief among these may be mentioned Ischistowitch,<sup>27</sup> of Botkin's clinic in St. Petersburg, who has published an elaborate research on the physiological and therapeutic effects of the drug. When the fluid extract of veratrum viride is given to warm-blooded animals, he observed that the cardiac contractions were greatly diminished in number, but afterward increased, the final slowing being due to stimulation of the vagus, both centrally and peripherally. The second stage of acceleration of the pulse was found to be due to a paralyzing effect on both the peripheral pneumogastric apparatus, and also to a stimulatory action on the accelerator nerves and centres. We have heretofore known that veratrum viride paralyzed the peripheral ends of the vagus; but the point as to what portion of this nerve was stimulated has been undecided. Ischistowitch states that veratrum viride produces a rise of arterial pressure along with the acceleration of the pulse. That some fallacy must underlie this statement cannot be doubted, since the drug has been used clinically for years, not only as a cardiac sedative, but as a vaso-motor depressant; and its chief value is supposed to lie in the fact that it may bleed a man into his own vessels. That the rise of arterial pressure occurs in the lower animals, under a poisonous dose of veratrum viride, is true without doubt; but that this effect is produced only by poisonous amounts, and is then due to asphyxia, and not to a direct action of the drug, has been proved beyond all cavil. It is also hard to imagine how any one using pure veratrum viride could find it of value in those cases of heart-disease where digitalis is indicated rather than a cardiac sedative. Its use at the bedside, by any one who has properly studied its physiological action, would certainly prevent its being employed in any case of cardiac depression. The experiments of Ischistowitch may therefore be regarded as of value only in so far as they support the results already obtained by previous observers.

## REFERENCES.

1. Cent. f. d. Med. Wissen. 2. Deut. Arch. f. klin. Med. 3. Zeit. f. klin. Med.
4. Lyon Méd. 5. Bull. gén. d. Thér. 6. La Semaine Méd. 7. Cent. f. klin. Med.
8. Revue gén. de Clin. et de Thér. 9. Wien. Med. Woch. 10. Deut. Med. Woch.
11. Therapeut. Gaz. 12. Wien. Med. Presse. 13. Medic. Contemp. 14. Cent. f. d. ges. Ther.
15. London Med. Rec. 16. Vratsch. 17. Berlin klin. Woch. 18. Provincial Med. Jour.
19. Untersuchung. aus Phys. Lab. in Würzburg. 20. Inter. Med. Chir. Rundschau.
21. Jour. Am. Med. Assoc. 22. Revue Méd. d. l. Suisse Romande. 23. Am. Jour. Med. Sci. 24. Med. News. 25. Lancet, 1880. 26. Therapeut. Gaz., 1886.
27. Arch. f. Exp. Path. u. Pharm. 28. La Tribune Méd. 29. Hospitalidende.
30. Cent. f. Chir. 31. Fortschr. der Med. 32. Pharm. Jour. and Trans. 33. Nouveaux Rem.
34. Brit. Med. Jour. 35. N. S. Med. and Surg. Jour. 36. Jour. of Phys. 37. Arch. de Phys. Norm. et Path.

[Undated references apply to journals published in 1887, and original articles can be found by consulting the indexes of the respective publications.]

**STORAGE**







